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Final Report

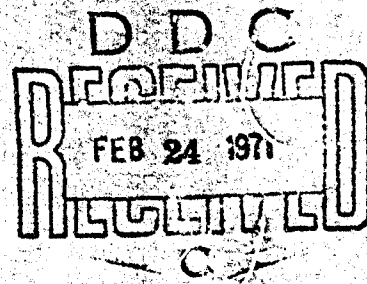
EVALUATION OF EMERGENCY OPERATIONS SIMULATION TRAINING

OCD Contract DAHC20-70-C-0293

Work Unit 2611E

Prepared for:

OFFICE OF CIVIL DEFENSE
Office of the Secretary of the Army
Washington, D.C. 20310



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Final Report Summary

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Summary Report of
EVALUATION OF EMERGENCY OPERATIONS SIMULATION TRAINING

This report presents evaluations of the OCD Emergency Operations Simulation Training (EOST) exercises conducted for local jurisdictions. The evaluations were based on observation and participation in five exercises as well as on analyses of the extensive experience of others. In addition, the research included estimates of current enemy attack capabilities, and studies of advanced civil defense conceptual developments.

The EOST exercises are well received and beneficial to local jurisdictions. In many cases, the exercises are the primary exposure of local personnel to Emergency Operations Center and simulation techniques. The overall weakness of the exercises is that they attempt to accomplish too much in too little time. Specifically, it is concluded that there is need for (1) more definitive local emergency action plans, (2) inclusion of natural disasters to enhance interest and scope, (3) extension of policy and planning level training to cover the disaster recovery time period, (4) changes in exercise procedures and the roles of players, and (5) more stress on mutual aid problems, including area-wide simulations.

Current enemy attack capabilities are estimated to include the ability to deliver over 900 warheads to the United States within the first hour after launch. From 30 to 60 minutes after launch, most communities would be within visible, audible, and earthshock range of the physical phenomena of direct effects. The attack might persist over 12 hours, and fallout would blanket regions of the country. The EOSTs address only the threat of a single weapon usually remote from the exercise community.

The OCD Research Directorate is presently field testing a zonal Nuclear Emergency Operations Plan (NEOP) action checklist for local jurisdictions. This concept will be supplemented by parallel documents dealing with extended areas (MACDO) and with natural disasters (NADOP).

It is recommended that the EOSTs should be expanded in scope from single exercises to a training program. Following an introductory exercise, similar to the present practice, the expanded program should develop competence with the NEOP and NADOP documents. Resource allocation problems for the recovery phase from disaster should be presented at local planning and policy levels. Finally, the EOST program should be addressed to the extended area problems, introducing the MACDO concepts.

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PREFACE

This is the final report prepared under OCD Contract No. DAHC 20-70-C-0293. It presents an evaluation of emergency operation attack scenarios, draws conclusions relative to the present conduct of the Emergency Operations Simulation Training (EOST), and recommends (in outline form) a modified EOST program.

This work is an extension of the research program conducted by the Emergency Operations Division of the OCD Research Directorate dealing with simulations and scenarios as background for other research activities and for training at local level. It is specifically defined to extend and enhance the methods, procedures, and findings that were developed under a prior OCD Contract (DAHC 20-68-C-0128).

Many persons contributed substantial time, effort, and knowledge to this research study. The Contracting Officer's Technical Representative, G. C. Van den Berghe, and the director of emergency operations research, J. W. Kerr, directed the conceptual development, provided input data, and critiqued the evaluations. Personnel of the University Extension Programs (UEP)--in particular, L. A. Snell and V. Cornors, University of Southern California; E. H. Wilkie, Jr., University of Arizona; and J. Waggoner, University of Colorado--provided data from their analyses of EOST experiences as well as from their extensive field experience backgrounds. The author expresses his gratitude to these individuals and to many unnamed others for their assistance in this research endeavor.

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I INTRODUCTION

Background

Past research on scenarios for emergency operations under Office of Civil Defense (OCD) Contract DAHC 20-68-C-0128 resulted in a transattack environment simulation. A play of that simulation was conducted with the mayor and his staff in New Orleans, and extrapolation of the results and findings of the play produced transattack scenarios for New Orleans and Detroit. In addition, the environment simulation was determined to be compatible with the Emergency Operations Simulation Training (EOST) exercises, and to be a suitable base for a research evaluation designed to enhance the EOST conduct and play. Several evaluation approaches appeared especially fruitful.

The methods, techniques, and procedures developed to simulate the transattack environment had proved to be useful research tools to explore the decision structure for emergency operations within a city. Simultaneous examination of the surrounding physical environment and the communications available to the city's decision-makers provided sufficient bases to derive a meaningful set of messages to simulate a crisis environment. It was concluded that the transattack simulation techniques would have application to other facets of emergency operations research. In particular, they might be useful to elicit pertinent responses regarding crisis plans and operations at local levels. They also might be a useful way to explore intergovernment relations between adjacent areas and between the echelons of government. Finally, the techniques might provide a suitable vehicle for education and training of civil defense personnel.

The past research extended to the state, region, and national environments affecting local governments. This knowledge resulted in an understanding of the roles of local government personnel in an emergency and of civil defense needs relative to local strengths and weaknesses. It was apparent that extension of the knowledge could lead to more sophisticated and higher confidence simulation concepts, which, in turn, could result in better training, planning, and operating doctrines and better procedures. The extension would be accomplished by:

- Further in-depth analyses of local government operations in the city and its environs.
- Further analyses of state, region, and national environments under transattack conditions.
- Further experimental research into simulation formulation and play, particularly incorporating more advanced conceptual considerations being developed by OCD and associated researchers.

The advanced OCD operating concepts involve a broader view of jurisdiction responsibilities than under normal peacetime conditions. The zones of operation concepts tend to require broad, flexible, and substantial pools of emergency personnel, resources equipment, and supplies. These requirements indicate the desirability of extending simulation models beyond present jurisdictional boundaries. An important finding of the earlier research, however, was that many pressures (political, legal, financial, and social) tend to confine the extent of city operations to jurisdiction and constituency boundaries. The EOST exercises appeared to be confined to these same areas, and did not reveal solutions to the intercity and extracity civil defense problems.

The findings from past research led to the statement of objectives for the present work, which was focused on improving techniques and extending the EOST program to include a broader spectrum of emergency operations. The work was conducted under the technical direction and with the assistance of personnel from the OCD Research Directorate.

Objectives

The general objectives of the research were to extend and enhance the methods, procedures, and findings that were developed under earlier work on simulations and scenarios. The contract defined the specific objectives as follows:

- B.1. Evaluate and refine the findings of the previous research in scenarios to:
 - a. Enhance its content relative to New Orleans and/or other cities.
 - b. Improve its conceptual basis.
 - c. Develop improved and/or more refined methods to provide input data necessary for the preparation of material suitable for EOST exercises.
 - d. Apply the methods (developed in B.1.c.) to the derivation of prototype EOST exercises, and to help by participating in the play of the exercises.
 - e. Evaluate the EOST derivation and play to reveal improved methods and content most useful to Emergency Operations at local government level.
- B.2. Further review and evaluate past emergency operations transattack simulation methods and findings, to determine their applicability to local and area governments

in the extended environs of metropolitan central cities with particular reference to improving civil defense emergency operations related to:

- a. Mutual aid
 - b. Local response to attack uncertainties
 - c. Contingency plan development
 - d. Basic operating situations (BOS) precepts
 - e. Nodal (Unit area) concepts
- B.3. Formulate a transattack environment simulation model, which will include the extended environs of a metropolitan central city, equivalent to a Standard Metropolitan Statistical Area (SMSA) and its trading area (as defined by Rand-McNally) in a format compatible with present and improved EOST approaches.

Research Approach

The approach to the emergency operation attack scenario development, as shown in Figure 1, centered around three work areas:

- Analyses of current nuclear attack capabilities and counter-measure requirements.
- Evaluation of current practices for the EOST exercises in terms of procedures and content.
- Development of new concepts from the OCD research and training programs centering on emergency operations.

Analyses of each of these areas revealed dynamic developments which present striking opportunities for enhancing the content and procedures of the EOST exercises.

OCD supplied a national attack pattern which is believed to be representative of current enemy nuclear attack capabilities. These attack capabilities are significantly different from those assumed in the play of the present EOSTs, and they reinforce the requirements for a modified threat statement. The attack pattern is described in Appendix A and is incorporated in the analyses of Section II.

The author observed and participated in the setup, training, and play of several EOST exercises, including one at state Emergency Operating Center (EOC) level. The format, procedure conduct, and results of these plays were remarkably consistent. Numerous evaluations by others

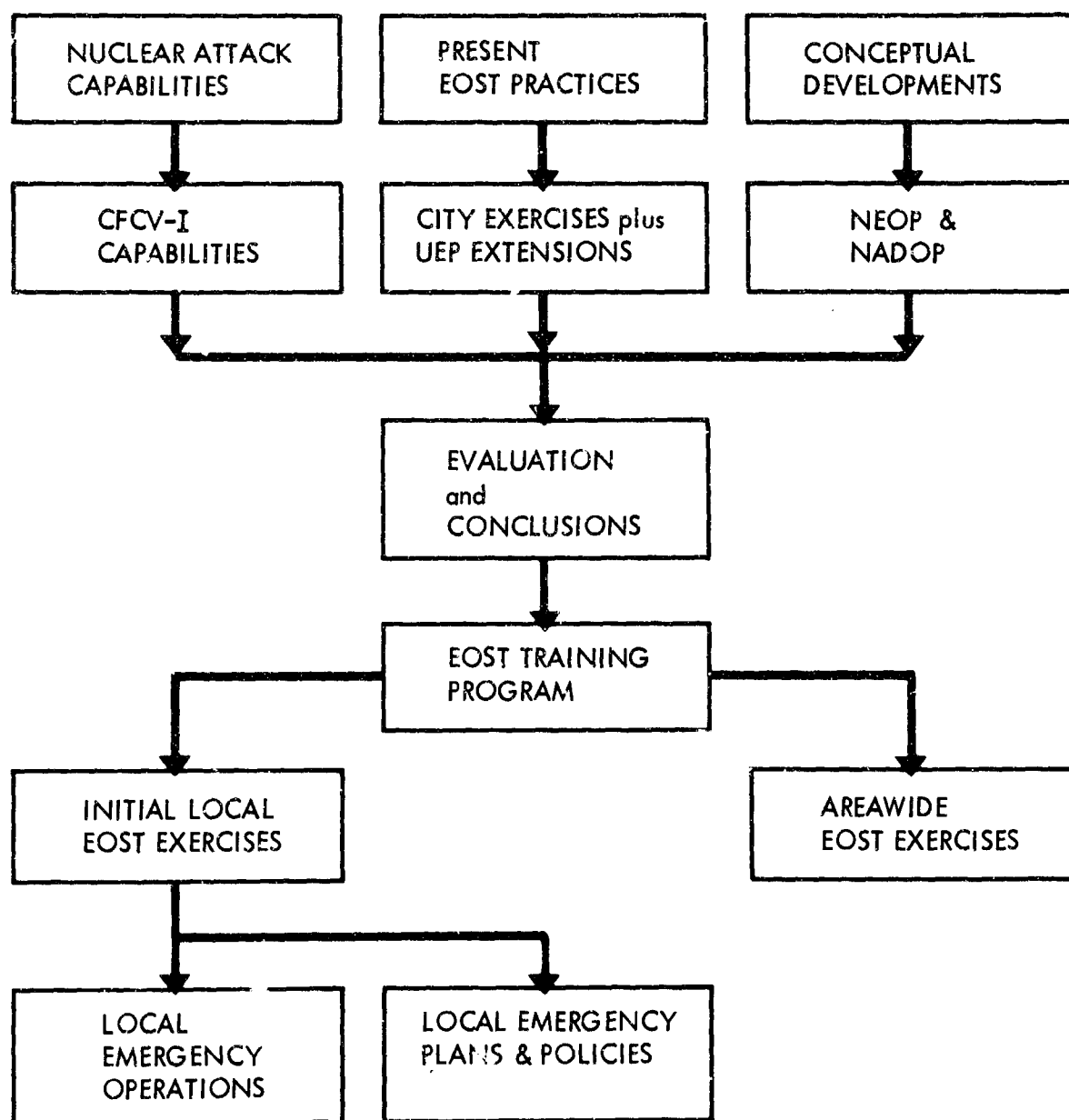


Figure 1. RESEARCH APPROACH

who have participated in the EOC exercises arrived at conclusions which are in accordance with the findings of this report. The records of these source materials are reported in Appendix B and are the subject of the analyses of Section III.

Over the past year the OCD Research Directorate has made significant progress in the development of emergency planning concepts which are presently being refined and field tested through a Master Checklist in the format of the Nuclear Emergency Operations Plan (NEOP) manual. A companion manual, the Natural Disaster Operations Plan (NADOP) is being prepared. These documents are being designed to give local civil defense organizations outlines of master operations plans. They will provide substantive content which has not been available prior to this time in the EOST exercises. This work is described in more detail in Section III, where the relation of OCD research to the EOST exercise program is discussed.

The analyses of the three areas of investigation were combined to draw a set of conclusions and findings relative to the EOST program (Section IV). The findings were then interpreted to suggest specific exercise modifications, which may be adopted into the EOST program as supplemental material for the present operations and simulation manuals, SM-4.1.1 and SM-4.1.2.^{1/} The recommended program modifications are reported in outline format in Section V of this report.

^{1/} Emergency Operations Simulation Training-Operations Manual, SM-4.1.1, and Simulation Manual, SM-4.1.2, Office of Civil Defense, Department of Defense, January 1967.

II EVALUATION OF EOST EXPERIENCES

This section contains a critical analysis of the OCD EOST experience, which is necessary to set the stage for the derivation of an improved program. The author would like to make clear and explicit his general impression that the EOST program as it exists today is one of the most relevant, well structured, and well executed programs that he has observed in civil defense during more than 20 years of experience with the various agencies dealing with the problem. The personnel who were observed, particularly at the University Extension Program (UEP) level, are of uniformly high caliber in their motivation, intelligence, and dedication to the endeavor. The high degree of enthusiastic participation by the simulators and operators during the EOST plays is also unusual. It is against such a background of regard that the following evaluation is presented as a basis for suggestions to enhance the value of the EOST experiences for all participants.

Following is a list of the most obvious attributes that are at least partially accomplished by the present EOST exercises:

- Recognition of the criticality of emergency planning and preparedness by local officials.
- Exposure to extant local disaster plans, community shelter plans, and resource lists, providing the opportunity for familiarization and improvement.
- Consideration of plans and operations on a group basis during the critique sessions.
- Demonstration of the need for integrating local emergency operations plans and community shelter plans.
- Training of responsible officials in problems of direction and control under emergency conditions.
- Exposure of emergency operating personnel to problems of cooperation and coordination between departments.
- Demonstration of the need to integrate special emergency forces--particularly RADEF and sheltering--with the regular forces.
- Recognition of the importance of the role of the local civil defense director within the local hierarchy.
- Recognition of the unique requirements and contributions of higher echelon government during the emergency.

- Exposure to the concept of EOC operations at local level.
- Work experience with room layouts, display boards, and message formats to allow consideration of those most appropriate to the local jurisdiction.
- Development of local capability to carry out further training exercises.
- Exposure to specific problems of nuclear war and the opportunity to acquire information on the special hazards and countermeasures.

The EOST exercises are conducted for local jurisdictions by UEP staff members. (UEPs are usually associated with state universities.) Considering the wide range of conditions encountered in local jurisdictions, the OCD procedures of SM-4.1.1 and SM-4.1.2 are remarkably appropriate and are followed closely by the UEP staffs. It is unnecessary to outline those procedures here, but a summary of the EOST exercise steps will help to put the following evaluations in perspective.

The heads of local jurisdictions are contacted by UEP staff members and given a briefing on the EOST program. These jurisdictions normally have populations ranging between 20,000 and 500,000. They have an EOC and a civil defense director, and they have indicated some interest in emergency preparedness. The training and execution of the EOST exercise normally takes a week (excluding earlier time for negotiations, announcements, reservations, and material collection and dissemination accomplished by local civil defense personnel). Early in the week there are high level briefings and extensive training sessions in EOST operations and procedures for all participants. The designated simulations group has additional training before it outlines the major disasters to be played. Messages are written for these events. The simulators then write additional general and emergency messages to fill the play time. For the regular operating emergency forces--police, fire, public health, and public works--these messages may be paraphrased from past department logs. Shelter, RADEF, and external jurisdiction messages are written by available personnel with strong assistance from the training director.

The exercise itself is normally played in the morning of the final day and is followed by a critique. It is held on the EOC, or a substitute area, with most missing props (telephones, message forms, maps, log boards, etc.) provided by the training director. The exercise starts with an announcement of attack warning and a briefing of events to that time. Messages then flow into the operations room, routed first to a message dispatcher and/or to the operations controller, and thence to the service chiefs for action. The chiefs and their staffs are grouped around a table. They decide the action and resources to be employed, coordinate with other agencies if necessary, and phone their orders to the simulators (who also are acting as dispatchers). The disposition is recorded on the message form and handled according to OCD procedures.

Meanwhile, important activities are plotted on maps and recorded on the master log.

A pertinent weapon burst is reported 30 to 60 minutes after the warning. RADEF data are plotted, often accompanied by oral announcements. Critical events are often reported orally by the civil defense director or city manager. The exercise usually terminates with the arrival of a relatively high level of fallout, and all forces go into shelter.

The critique, conducted by the highest ranking civil officer, is used to evaluate the play and the procedures, and to suggest areas for improvement.

The above brief outline of steps indicates the procedural nature of the EOST exercises. The following subsection includes observations about emergency and attack conditions which are the basis for the EOST exercises. Summaries of background data that were pertinent to the evaluations are presented in Appendix B.

Emergency Operations Attack Environment

The EOSTs as currently played are based on emergencies engendered by an aggressor's nuclear strike on the United States. Such a current strike capability is described in the Counter Force - Counter Value I (CFCV-I) attack in Appendix A. This attack comprises many (almost 1,300) weapons directed against military and civil targets in such a manner as to cause extensive casualties and loss of resources, as well as an extensive fallout that blankets areas of the country. The attack lasts over 12 hours. (Appendix Figure A-1 indicates the extent of the attack.)

Figure 2 shows a plot of the CFCV-I ground zeros in the San Francisco Bay Area to illustrate the nature of current attack capabilities. A total of 18 one-megaton weapons are detonated between 30 and 50 minutes after the initial launch of the attack. Four additional weapons of two- and three-megaton yield arrive at 1230 and 1240 hours after launch. The circles drawn on the map are the 10 r/hr radii (50 percent fission weapons) for early fallout with no wind. (It is interesting to note the four detonations at three-minute intervals at the ground zero immediately south of Hamilton Air Force Base.)

In addition to portraying the saturation effect of physical damage to the San Francisco Bay Area, the map also indicates the blanketing effect of fallout resulting from these weapons. The crosswind dimension of the fallout cloud from the initial salvo would be from 50 to 80 miles, depending upon wind direction. From the second salvo it would be from 30 to 60 miles. In relation to the total area attack pattern, even these estimates are low. Surface bursts in north and south lines along the Pacific Coast and in the Central Valley would considerably extend the blanketing effects.

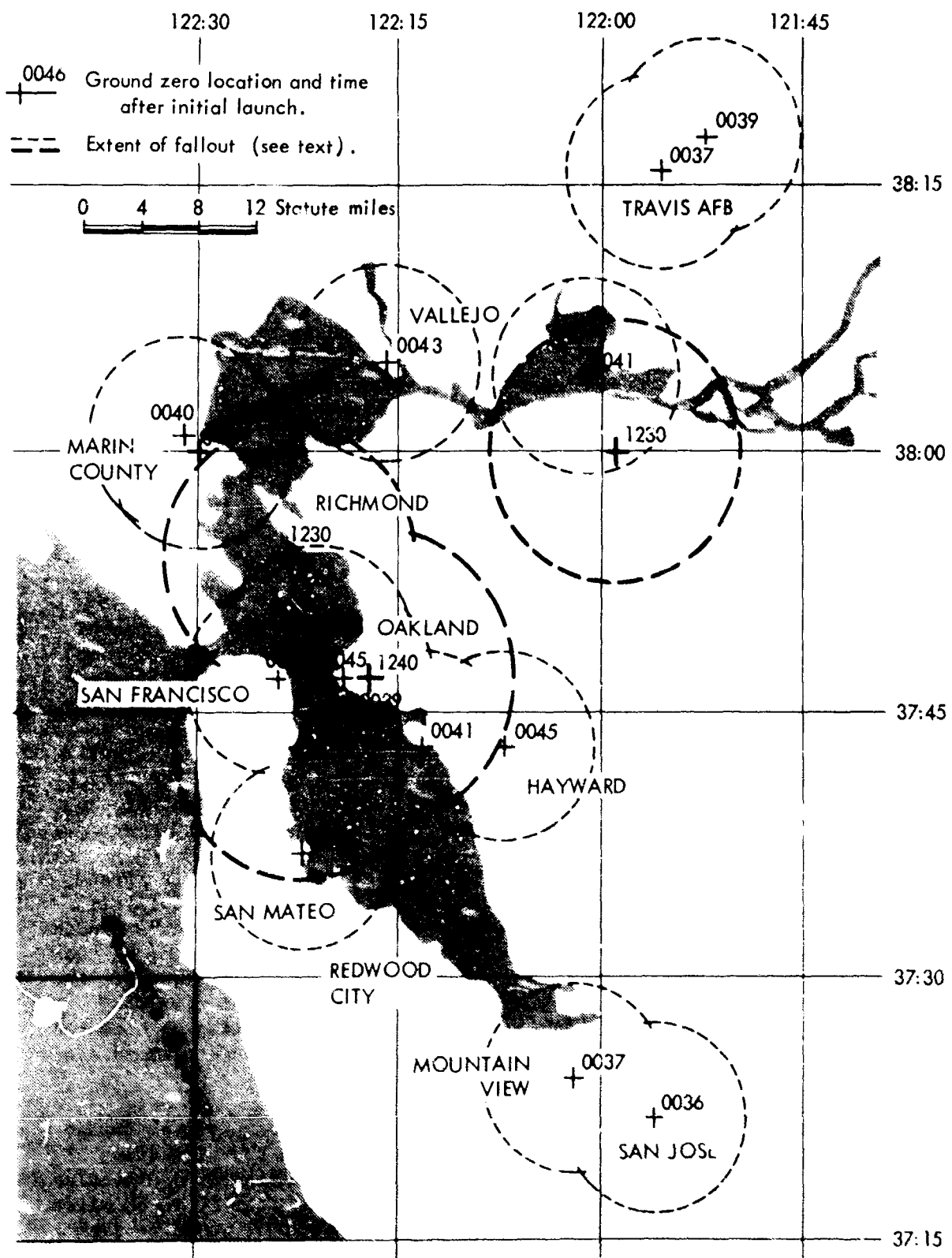


Figure 2. EXAMPLE OF CURRENT ATTACK CAPABILITIES

The present EOST exercises address a very junior version of this problem. Following the initial announcement of attack warning, there is no subsequent news of the progress of the war. The common approach is for the exercise director to select a single detonation point remote enough from the jurisdiction to cause little or no prompt damage, and to involve later downwind fallout. This burst point is reported, followed quickly by a prediction that fallout will arrive in the exercise jurisdiction after a specified interval. Because the game is played in a short period (two to four hours) of real time, the arrival of fallout normally marks the end of the problem, with everyone retreating to an in-shelter condition for an unspecified future period.

A frequent criticism of the present EOST exercises is that they are based on a nuclear attack, rather than on "more probable" or more readily acceptable natural disasters. Obviously, OCD has been constrained here, because of its central objectives based on nuclear attack. The criticisms are answered by the EOST directors in several ways:

- By the rationale that a nuclear attack is the worst disaster, so that "if you are prepared for it you are prepared for anything."
- By the introduction of natural disasters as the primary action items, and the subordination of the nuclear problems in the exercise.
- By the explanation that the funding is from DOD so there must be a wartime relation, but that emergency operations are all the same "so it really doesn't matter."

Lest these comments be interpreted as a "cop-out" by the exercise directors, it should be remembered that they are faced with "selling" a training program in competition with urgent alternative demands on the time of busy public officials. One city manager remarked that the operations exercise room was certainly quiet compared to his office where preparations were being made for an anticipated SDS/racial militants' demonstration at the next Board of Supervisors' meeting.

While many emergency situations and emergency countermeasures of nuclear war are similar to those peacetime or natural disasters, several requirements are unique in kind and/or degree:

- Understanding of radiological defense problems, including the training and acceptance of data regarding radiological hazards, and a definition of the role and responsibilities of the RADEF officer relative to the regular public safety forces.
- Acceptance of the state of conflict with an intelligent, determined and powerful enemy, who is purposely inflicting destruction upon the country and the community.

- Endurance of the stress imposed by war-based uncertainties with catastrophic local consequences as to the duration or resumption of attack, the arrival and levels of fallout, and family status. To these are added uncertainties of remote destruction to other areas and of the survival of the nation.
- Appreciation of the extraordinary breadth of damage to the total United States (as it differs from the local or regional aspects of the normal, natural disaster), and the concomitant necessities to evaluate the role of local resources vis-a-vis resources of the country as a whole. This evaluation includes not only the inability to receive a normal inflow from outside the community but also the possibility of an extraordinary demand being levied upon the community.
- Exposure to the concepts of mass protection of large portions of the population in shelters and shelter complexes, and an appreciation of the roles and responsibility of the shelter managers' problems and requirements.

The present EOST exercises at most only introduce the special nuclear attack problems--at least, the exercises ignore them. Given the mood and state of preparedness of most local jurisdictions, however, the present exercises may still be attempting too much. It may be a sufficient start merely to achieve acceptance of the concept of emergency preparedness--with the hope that this start will lead to more sophisticated understanding later.

EOST Objectives

It is perhaps significant that neither the simulations manual nor the operations manual for the EOST exercises contains a statement of objectives. While the nature of the program and the content of the exercise format and procedures are indicative of the objectives, the lack of such an explicit statement precludes an evaluation of how well a program is progressing. On the other hand, the introductory statement to each of the EOST exercises observed by the author has included several general points which are largely noncontroversial and pervasive.

- To discover ways to make maximum use of total resources, public and private, which might be necessary to cope with a large-scale disaster.
- To enhance coordination and cooperation in joint operations between several departments to handle a job that would otherwise be too big for one department to handle alone.

- To pool information, to arrive at a common understanding of problems and a general agreement on an overall strategy to cope with an otherwise overwhelming situation.
- To achieve procedures to disseminate through the command channels to each department coordinated instructions and information necessary to insure the most effective deployment of resources in joint operations.

These objectives are general in nature and certainly laudable without regard to the mission of OCD, state, or local civil defense, or to the specific emergency requirements of local government. And, in general, they are addressed by the current exercises. All observed introductory statements explicitly state that the EOST exercise is neither a test of individual or group performance, nor a test of procedures or plans (despite the natural tendency of the simulators to give the operators "real tough" problems and or the operators to feel they have "beaten" the simulators with their solutions). This rule is followed in the critique sessions where there seldom is critical comment about the performance of any group or individual.

In summary, then, the emphasized objectives of the initial exercises are to promote the recognition of the roles of the emergency forces in large-scale disasters, to exercise personnel in these roles, and to promote cooperation among the services.

As noted, nuclear attack does impose problems unique in kind or degree. There well might be another set of objectives that are more specifically related to the OCD mission. Two of these--fallout and mass shelter--are brought to the attention of the players. Given the inherent problems of the EOST program, perhaps it is best to leave unique nuclear war objectives unstated--and to allow players to discover and understand them on their own.

EOST Content

It has been noted that the EOST exercises are conducted, for the most part, in accordance with OCD procedures. The content of most exercises includes:

- Pre-exercise war buildup to attack warning early in the exercise period.
- Move-to-shelter instructions, with reports of rapid, orderly compliance.
- Announcement of a downwind NUDET 30 to 60 minutes into the exercise.

- Fill-in messages regarding normal emergencies, with heavy emphasis on interdepartment activities.
- Periodic fallout predictions leading to its arrival in the jurisdiction. Then, fallout increases rapidly to terminate the exercise with everyone going to shelter.

Often, at the desire of the local jurisdictions, a major natural disaster is superimposed which pre-empts the activities of the emergency operators from the nuclear war. There is a dearth of interjurisdiction, vertical-jurisdiction, and war-related messages. Even in those cases where multiple-jurisdictions are involved--as in a city-county exercise--the players who do cooperate tend to represent those functions whose day-to-day activities are cooperative.

The bulk of the messages and most of the individual play time and energy is spent on relatively routine problems introduced by the simulation group and handled by the operations group. (An effective way for the simulators to write these messages is to refer to the log books of the various departments and to paraphrase emergency calls from the last six months' experiences.) The simulators and the exercise director purposely select emergencies involving resources and personnel of two or more departments (for example, an overturned petroleum truck, which requires fire, highway patrol, and medical departments). Because the exercise starts at zero time following an alert, and lasts for only a few hours, emergency resources are seldom strained or saturated. In those few exercise incidents where they were strained, the nature of the emergencies was so severe and multiple that they exhausted the credibility of the players. Moreover, there were few cases where these emergencies particularly related to the war situation. Even an assumed high level of rioting and sabotage is not uncommon in our jurisdictions today and should not be regarded as the result of an attack, even though it may have been so attributed by the players.

The handling of emergencies by the fire, police, public health, and public works officials and staffs always proceeds neatly. Although relations between police and National Guard forces to control riots are more tenuous, recent experience here is leading to a good mutual understanding of their respective roles.

When it comes to the mass shelter and fallout functions, the exercises revert to solving problems by fictitious assumptions. People are instructed to go to predesignated shelters which are assumed to be open, stocked, and managed in a totally effective manner. Only two sets of problems are simulated here. First, there is the problem of the loading of shelters and the reallocation of people from full shelters to those with available spaces. Shelter managers report rapid filling with no conflicts. Relocation is handled readily by the operators and simulators who issue orders to the manager whose shelter is full to redirect the people to another shelter. With this action the problem is finished. Second, simulators commonly inject an emergency condition in a shelter

that requires the operators to instruct either the emergency forces to take care of the incident or the shelter manager to relocate his shelterees to other available spaces. With those decisions the matter is finished.

The progress of the fallout from the burst point to the exercise area is handled by the RADEF operator and his counterpart simulators. These data are preplanned according to the wind direction and speed. Often the wind velocity is increased by the simulator during the course of the play. Times and intensities are read from simple overlays and duly recorded. In no exercise observed was there a state of uncertainty or anxiety as to whether the exercise area would actually be subject to fallout. There is a clear lack of operating information at local level concerning the nature of the radiological threat, the appropriate countermeasures, and the permissible exposure times. These problems are handled in a straightforward manner by sending all people to shelter when fallout arrives and then deciding whether or not to use the emergency operations personnel for other local emergencies.

In summary, the content of the EOST exercises does not involve the degree of stress of nuclear war; it does not saturate the emergency forces of the normal public safety agencies; it imposes coordination and cooperation requirements mainly on those agencies which normally coordinate and cooperate anyway; and it tends to bypass extraordinary requirements by convenient assumptions.

Local Operations

Many jurisdictions in the United States have emergency operation plans and lists of resources, generally with annexes specific to each operating department. Unfortunately, the plans are general in nature and usually old (even though the documents show little wear, making it obvious that they had not been read except perhaps immediately prior to the exercise). The plans resemble, in military parlance, tables of organization and equipment rather than contingency plans which specify courses of action to be taken in reaction to a hazard. The assignments for the normal public safety departments generally list their normal duties without appreciation of special problems imposed by nuclear war or other catastrophic disaster. The special sections relating to RADEF, shelters, and damage control are normally general and of little help in an emergency. (The "Federal Civil Defense Guide" is most often referred to as "a worthless document".) The EOSTs neither test nor purport to test emergency plans in any sense of the term. The allocation and assignment of resources is done on a person-to-person basis, with the appropriate department staffs calling on resources from their memories. Only occasionally do they make mistakes in allocating forces already committed.

There are several procedural areas of the conduct of the EOSTs which probably would benefit from revision. The first relates to the configuration and staffing of the various service desks. Within the constraints of the physical layout of the EOC, these staffs are normally arrayed around tables by service. The service chief is at a table with his senior subordinates. A message is delivered by a messenger. They decide upon a course of action, coordinating it with other staff counterparts in other departments. They then transmit this information to a dispatcher who orders out the forces. Meanwhile, someone has informed a plotter to move the flag on the map, and if the message was critical enough, it has been recorded on the log blackboard. Finally, the disposition is written out by the members of the service chief's staff. Copies are provided to the operations controller and one is retained at the service chief's desk.

This procedure tends to create a large "paper mill," which the operations people find very frustrating. When they are sharing action with another department, they are required to copy the information portion of the original message for the other department. There is frequent testimony to the fact that the service people refer neither to the area maps nor to the common emergency log which are on display. Moreover, they are accustomed to having other people handle their clerical work and often do not perform it well themselves. Consequently, it would be far more effective to have the regular department secretary handle all of the paper work and to maintain a department log for the staff members. This would also simplify the pre-exercise training period as far as the staff is concerned. A large portion of the preparatory time is devoted to explanations of the methods of filling out the OCD forms and to transmittal procedures. It is apparent that much of this work could be accomplished better by trained secretaries than by their executives.

The proper role for the operations chief has been the subject of considerable comment in the EOST critiques. The ambiguity of this role may be unavoidable because of the various individual local area procedures and the accustomed authority hierarchy within that area. In peacetime it is most unusual to have such a position between the service chiefs and the political leaders. Thus, the role of operations chief may be either to take true command of the departments in the conduct of their activities, or to serve as the message coordinator. In the former case he is likely to be an executive assistant to the city manager. Most local areas, in fact, have radio dispatchers who receive oral emergency messages from the reporting services and refer them to the proper departments and echelons for decisions. The action items are then transmitted by the dispatcher who often maintains his own log. In none of the observed exercises were these regular dispatchers present. It is suspected that in a real emergency--which is the object of the simulation--these dispatchers would, in fact, refer the emergency messages to those departments with which they customarily deal. The regular public safety departments would then either act upon them or refer them to the special groups which are set up to handle the special emergency functions. Such a sequence obviates the need for the operations chief.

This leads to observations about the roles played by the "regular" versus the "special" emergency forces. The chiefs of the regular forces--fire, police, public health, and public works--are on a first-name basis with each other and with the political leaders. They have professional status. They have trained operating staffs, physical resources, and established procedures. They are on a first-name basis with their counterparts in adjacent and superior jurisdictions. Often, they have mutual aid pacts, subject to a history of planning, testing, and implementation. Coordination and cooperation between these individuals is brought out well by the EOST exercises.

On the other hand, the special services are usually manned by relatively unknown outsiders or by personnel detached from the regular forces. These special forces usually include damage assessment, RADEF, welfare, shelters, resources, and the civil defense director himself. Here, the attributes listed for the regular forces are largely lacking. The EOST exercises reveal that the most difficult communication and coordination exists with these special forces.

A frequently recurring question in the evaluation of the EOSTs relates to the role of the top city officials--the policymakers. These officials most often include the service chiefs, but the nature of the present EOSTs isolates (probably artificially) the service chief in an operational role. In peacetime, the chief uses his staff and secretariat to accomplish the normal operational duties. He is an executive who participates in major policy issues.

The EOST exercises do not deal with problems of source data, analysis, and communications which are required to produce intelligence that can then be formulated to policy as a guide for future actions. It is believed that this issue relates directly to the earlier discussion of the time period of the play and to the lack of uncertainty which would be imposed upon the jurisdiction by the wartime environment. This intelligence function would require coordination with adjacent and higher echelons of government, as well as data input from the local operating departments. Perhaps an attempt should be made to get the policymakers to think through the problem in the early time frame to provide guidance for future operations. If this were done concurrently with the input of operational mess, would tend to force a new organizational structure on the EOC and would introduce noise and stress into the system in a healthy manner.

III RELATION OF THE OCD RESEARCH PROGRAM TO EOST EXERCISES

The EOST program was initiated by the Research Directorate. For several years, the exercises have been conducted under the purview of the OCD Plans and Operations Directorate through the regional training officers. The exercises are coordinated with the state civil defense offices, conducted by UEP personnel, and directed to local jurisdictions. As such, the exercises presently have no direct connection with the OCD research program. Yet, in the whole field of emergency planning, preparedness, and implementation, the local jurisdiction is the fundamental operating unit.

The evaluation of EOST exercises pointed out the significant gap in local operations created by the lack of action plans (specific reaction checklist sequences prompted by specific threats). The OCD Research Directorate is filling that gap with the present NEOP and the proposed NADOP. The relation of these plans to the EOST program is analyzed in more detail in the last part of this section, following discussions of the more general relations between the EOST exercises and the research program.

Operating Area Concepts

An important element of the continuing OCD research program deals with concepts of operating areas as a basis for emergency operations. Political subdivisions are obvious. The geographical distribution of population and resources also has been represented in various ways to meet specific requirements. For example, the early work on damage assessment used a UTM grid coordinate system and identified resources to central points. This work has now been refined to use the longitude-latitude grid and to recognize the political jurisdiction hierarchy.

Nodal concepts also involve the identification of resources to points and establish the connection between these points. The BOS precepts recognize the division of population and resources into homogeneous geographical areas. These areas are then subject to classification by degree and time of destruction or hazard. The concept of the Five City Study deliberately selected representative cities to form a common evaluation base for the many research projects applicable to local population and resources. Obviously, the work of the Research Directorate in training and in evaluation of natural disasters also deals with the areas similar to those covered by the EOST exercises.

All of this leads to the conclusion that the potential contacts and exposures of OCD to local government enjoyed during the EOST exercises represent a fertile field for down-to-earth experience for the research community. Properly structured, this could be an effective two-way street. The researcher could gain immediate data and knowledge of the

environments for his studies. At the same time, he would often be in a position to contribute valuable knowledge to the local emergency operating forces and to the emergency plans of the local areas. In addition, he could provide a valuable function as a feedback loop, reflecting local area needs in his research proposals and studies.

Future OCD Concepts

The present EOSTs are local training exercises, and as such do not directly relate to the development of advanced civil defense operating concepts. They are not applicable as experimental test beds to exercise the newer concepts because it is explicitly stated that they are not to serve as a test of local systems. Perhaps OCD observers from the regional offices or the UEPs could be charged to become sensitive to unique problems which might arise in a local jurisdiction and to relay these problems to the OCD Research Directorate. These problems would then represent a select group of targets of opportunity for research exploitation. The present summary reports to OCD do not fulfill this requirement, and, it must be admitted, the author did not find critical opportunities in the exercises which he observed. The persistent lack of knowledge regarding fallout effects, hazard, and countermeasures requires education beyond the province of research. The implications of areawide destruction versus the interdependencies of local jurisdictional units may be a vital area for improved understanding.

Emergency Countermeasures

The evaluation of the EOST exercises indicates little relation between the OCD research programs and the functions of the local emergency operating forces. In no cases were there extreme levels of prompt effects and, as indicated, the exercises ended with the assumption that personnel would go into adequate shelter. During the play period the local emergency forces conducted themselves on a "business as usual" basis.

Much of the work that has been and is being accomplished to understand the transition of the country from peace to war, to shelter, and to postwar emergence and recovery should be introduced to the EOST exercise program, particularly as it gains sophistication and moves toward evaluation of the recovery phase. Local jurisdictions are uniquely competent to plan and operate their forces within their jurisdictions and to conserve or expend their resources on a prompt basis, but there is little in their background to guide them into the latter phases of a disaster situation. Formulation of statements of postattack conditions would depend upon structured inputs from OCD (or others) strongly reflecting the progression of the national disaster. Reduced to simulation format, this would provide local decision-makers an excellent opportunity for training in a new, vital area.

Operating Plans

At the present time the OCD Research Directorate is engaged in testing and reviewing its Alpha NEOP. Much of the work was accomplished by W. E. Strobe of the Research Directorate and by C. T. Rainey of the Stanford Research Institute. NEOP is a Master Checklist intended to be used as an operational guide for small jurisdictions (or subdivisions of larger areas). It is appropriate for use in training and operational exercises with the addition of a scenario or simulation to generate attack-related events. Also, the OCD Research Directorate intends to develop a NADOP as a companion to NEOP. A preliminary draft version of NADOP has been prepared by OCD Region II staff.

Implementation of both NEOP and NADOP will be accomplished by local jurisdictions. These plans will fill an important void in emergency disaster planning revealed by the EOSTs. The void is a lack of substantive--i.e., the what-to-do and how-to-do-it--direction in response to various kinds and levels of hazards. (The Alpha plans relate to local jurisdictions on a zonal basis; Bravo plans are being considered to relate to broader jurisdictions of government.)

Implementation of this type of planning will be difficult for local jurisdictions for several reasons. Local personnel are saturated with their daily tasks. They are not accustomed to contingency planning, and they do not have technical knowledge or operating experience with disasters. Therefore, as it appears to be a favorable time to modify the EOST program, it should be used to introduce the NEOP and NADOP concepts. Seldom is a potential combination so propitious.

The nature of the required modifications to the EOST exercises may be readily summarized:

- A program of exercises will be required to cover the NEOP and NADOP alternatives.
- The UEP exercise director will provide a much greater amount of simulation input material to the exercise in the form of disaster messages from outside the exercise jurisdiction. (For whatever combination of disaster events chosen, he will have to trigger the conditional and discretionary actions.)
- An outside controller (and/or simulator) will be required to fulfill the role of MACDO. (MACDO--for Metropolitan Area Civil Defense Organization--is the code word used in NEOP to designate the next higher operating center or communication link to the state level.) If there is a real MACDO person above the exercise jurisdiction, it would be desirable to have him fill the role; if not, the UEP personnel should perform the task. (Among the obvious advantages of

using the real MACDO are training for him and the opportunity to establish face-to-face personal relations.)

- The emphasis of the exercises will shift from EOC message handling operations for routine emergencies to substantive planning for major disasters. This planning may require more OCD/UEP participation in devising substantive counter-measures.

IV CONCLUSIONS AND RECOMMENDATIONS

Conclusions

These conclusions relative to the EOST program are drawn from the foregoing evaluations. They will lead to recommended modifications to the present exercise schedules.

Objectives

The objectives of the EOST exercises are not specified in the OCD manuals. They are implicit in the program itself, but explicit statements would sharpen the purposes for the participants. The exercises involve recognition of the roles of the emergency forces in disasters, impressing the participants with the scope of the problems to be encountered, and emphasizing the needs for preplanning for the commitment of personnel and resources. Coordination and cooperation between the emergency departments is exercised by the selection of the joint problems which lead to derivation of common strategies and operational procedures to cope with the emergencies. In most communities the concept of training for large-scale disasters is a new experience, so demonstrations of training techniques based upon simulations are valuable. The concepts of an EOC (command post) exercise are also valuable. Further, data displays, paper forms, and message flows are introduced and their value is subject to local consideration.

Emergency Plans

The EOSTs attempt to pit emergency plans and personnel against simulated disasters to suggest improvements, and to point out and allow the removal of deficiencies in the plans. The introduction of NEOP and NADOP may provide more valid plans. The exercises also provide experience to the players. Normally, it is carefully stated that the purpose is not to test the plans or the personnel, in the sense of a rating system or of criticism of individuals' knowledge, diligence, or intelligence. Nevertheless, the players tend to feel competitive not only because they are operating in the presence of their superiors, but also because the nature and structure of the EOST exercise involves simulators and operators in game-like roles. It is perhaps unfortunate that more diligent evaluation of the play and the local plans is not pursued to lead to more valuable exercises and more effective plans, but the introduction of such requirements would introduce concomitant problems (of format, style, and control) so great as to jeopardize the entire EOST program.

Nature of the Disaster

The inclusion of nuclear attack, particularly into an initial EOST, often meets resistance at the local level. Many local officials do not consider nuclear war a likely possibility or within their area of responsibility. While there are unique disaster elements to a nuclear attack--a purposeful enemy, abnormal stresses and uncertainties, the great breadth of damage, the fallout hazard, and problems of mass sheltering--they are normally played down or ignored in the present EOST exercises. It is doubted that the conventional imposition of a single remote nuclear detonation with fallout, which terminates the game, really simulates the current concepts of an intercontinental nuclear attack. The greatest value of the introduction of the war disaster is a recognition on the part of local operators of their lack of training and preparation for the fallout hazards and the problems of mass sheltering. Thus, the addition of natural disasters not only would provide added content but also enhance interest in the EOST program.

An Exercise versus a Training Program

The present OCD procedures do not imply a course of training versus a single exercise. There is too much to accomplish to expect lasting value to derive from a single EOST exercise. New concepts are introduced to the players and training is required in both breadth and depth. The EOST exercises are expensive to local government, to OCD, and to UEP personnel. Many hundreds of man-hours go into each such exercise. It appears that initial objectives could be accomplished with reduced man-hours by simplifying the initial exercise procedures. These hours could be devoted to later, more directed endeavors.

Allocation of Resources

While each jurisdiction observed for an EOST exercise had at least a partial list of resources, these were seldom used and were certainly not critical to the play of the game. The reason, in part, was that the relatively short real time involved at the start of such a disaster does not impose problems which would exhaust the resources. Nor was the nature of the initial problems encountered such that they even tended to put heavy demands on resources or personnel. The occasional problems that might have strained resources were either ignored, evaded, or assumed away in the course of the exercise. The duration of the play period should be extended (by compressing real time or skipping intervals) to require planning for resource allocation.

EOC Operations

The introduction of the face-to-face relationships between the service personnel of the various departments is undoubtedly beneficial.

These personnel recognize each other as individuals, and they tend to recognize the problems and competencies of other players. Most of the problems handled at the EOC service desk are similar to those encountered during day-to-day operations. These problems are normally handled by on-duty staff of the department, so the presence of the service chief is somewhat superfluous. (Obviously, he should be available to provide information and to make policy decisions.) On the other hand, the play of the EOST involves the handling of a tremendous amount of paper and requires the maintenance of service logs. If a secretary were available to the staff, she would greatly expedite the clerical functions.

Aside from a large-scale map of the jurisdiction and a smaller-scale map of its environment, the data displays were seldom used by the operations people. Normally, these staff members are involved in their department problems and in coordinating specific problems with other groups. Oral status reports would serve better to remind people of outstanding emergencies and to give general status reports.

The message dispatcher is a key figure in the conduct of the EOST exercise. His ability to route and assign priority to messages properly tends to control the pace of the whole exercise. While most jurisdictions have peacetime dispatchers who receive and route emergency calls, in none of the EOST exercises was the message dispatcher function played by the real individual. The role of the operations chief is not a normal function in local government. There is no one who sits between the regular service chiefs and the political manager of the jurisdiction. Therefore, this person tends to be in parallel to or in place of the message dispatcher, or he assumes the role of the chief executive. (When the latter happened, the individual was normally a highly placed executive assistant in his peacetime role.) It would seem more appropriate for the EOST exercises to follow the normal organization of the jurisdiction involved in the exercise.

Regular versus Special Emergency Services

Usually, the heads of the special services are either outside or on the fringe of the jurisdiction hierarchy, or they are personnel from the regular services assigned to the special function. It is readily apparent, from observing the EOST exercises, that the regular service chiefs enjoy prestige with the policymakers based upon their executive roles in city government and their professional status. The EOST exercise is often valuable to the local civil defense director because it tends to enhance his prestige with the regular department chiefs and with the political leaders. It is also valuable to have the special services exposed to the regular services. On the other hand, to the degree that the special services are, in fact, subordinate to the regular emergency services, artificiality is introduced into the exercise which probably would not carry over into a real disaster situation. While such matters of local organization are properly beyond the scope of this evaluation, it is apparent that the simulation is weakened by the introduction of an artificial set of relationships.

Mutual Aid

The insular nature of the EOST exercises is a hallmark and was the motivating factor for the research investigation. The regular emergency services are, in fact, quite capable of acting across jurisdictional lines with lateral contacts and agreements between individuals and jurisdictions. These are practiced frequently and communications are exercised on a daily basis. In those exercises which involved more than one jurisdiction, the perceived mutual problems were handled jointly with a minimum of stress. When questions arose regarding the role of another agency, such as the State Highway Patrol interaction with local police traffic control, the local service chief was confident of his position and of the support which he could expect to receive. No other mutual aid types of problems were considered or exercised during the course of the EOSTs. It is concluded that operating problems of mutual aid should stress unique disaster functions more explicitly, and policy and planning problems of a continuing nature should be explored.

Leadership Roles

In the normal practice of local jurisdiction leadership there is relatively little vertical command exercised above the service chief level. Between the services there are personal contacts and long histories of operational jurisdiction and responsibility which obviate the need for superior direction. At the political level the relationships are such that the notion of the city manager being directed by a county manager or even a state governor is so unusual as to be nonexistent.

Present EOST exercises deal with the early, prompt actions of population control and aggravated degree of a normal kind of emergency service. These do not get into problems of vertical command. Longer-term actions which might involve higher echelon forces are precluded from the EOST exercises by the relatively short time period. The mayor (city manager) tends to be a figurehead in the EOST exercises as they are played, because the bulk of the play relates to the regular service departments which are competent to handle their problems. The special service functions are of a nature remote from the normal interests of the mayor, so he tends to delegate judgments to his regular service chiefs. Moreover, there are few policy decisions which arise during the first hours of the play. Questions of stress and morale problems do not arise in the play either. (Often, it is suspected, because neither the simulators nor the operational chiefs wish to indicate anything other than their competence to deal with the disaster situations.)

It is apparent that the real emergency conditions of the simulated disaster would impose a need for plans and policies to be made for future conduct. These would necessarily have to be derived concurrently with the early operational solutions. This suggests that a concurrent higher level play should be evolved, which would require the policymakers (including the regular service chiefs) to gather data and respond to demands

beyond their normal jurisdiction. They would also have to make contingency plans responding to the stress and uncertain disaster situation.

Recommendations

An overriding conclusion may be expressed as a simple thesis: the present EOST exercises attempt too much. While training through simulation exercises is valid, cramming so many objectives into a single exercise results only in omissions, unworthy assumptions, and oversimplification. For example, it must be recognized that the EOSTs largely avoid the major problems posed by a nuclear attack like the CFCV-I. To the extent that the EOSTs are viewed as a continuing experience for the players, one might argue that they are a first step, but this argument is valid only to the extent that there are continuing exercises and that the initial training is, in fact, a proper preliminary step toward the real problem. These assumptions are not currently justified. The UEP at the University of Southern California is presently proposing, and has several acceptances, of a continuing program. Several jurisdictions have had more than one EOST. Arizona, for instance, has conducted a statewide exercise, and Colorado is considering a second exercise involving a later timeframe when resource allocation would be a vital issue. These, however, seem to be isolated instances and are not part of the EOST program as outlined in its manuals.

The elements of a modified EOST program are presented in Figure 3. The present initial EOST exercises should be continued to preserve their demonstrated attributes. The objectives of the exercises, however, could be limited to the organization and procedural aspects for the emergency operating functions. In line with these more limited objectives, the initial type of disaster to be played should be selected by the jurisdiction itself. Further, the local jurisdiction should be encouraged to optimize their normal modes of emergency operation and their normal cross-department communications. The losses in effectiveness that would be sustained by not following the OCD procedures would be more than compensated by the ease of initiating and effecting the exercise. Furthering this concept, the deterrent of the high expense of the EOST in terms of local staff and UEP participation could be alleviated.

Following the initial EOST exercise--assuming a sincere motivation on the part of local government to enhance its emergency preparedness capabilities--a training program of EOST exercises should be offered. It should be conducted at two levels, stressing the operating problems of the emergency services and the policy problems of the local decision-makers. Included in the operating problems should be a recognition of the current concepts for nuclear war and training by simulation exercise for nuclear war countermeasures. In addition, such a program should deal with the specific requirements of natural disasters viewed likely in the local area. Special problems requiring interdepartment and inter-jurisdiction operating cooperation should be included in these exercises:

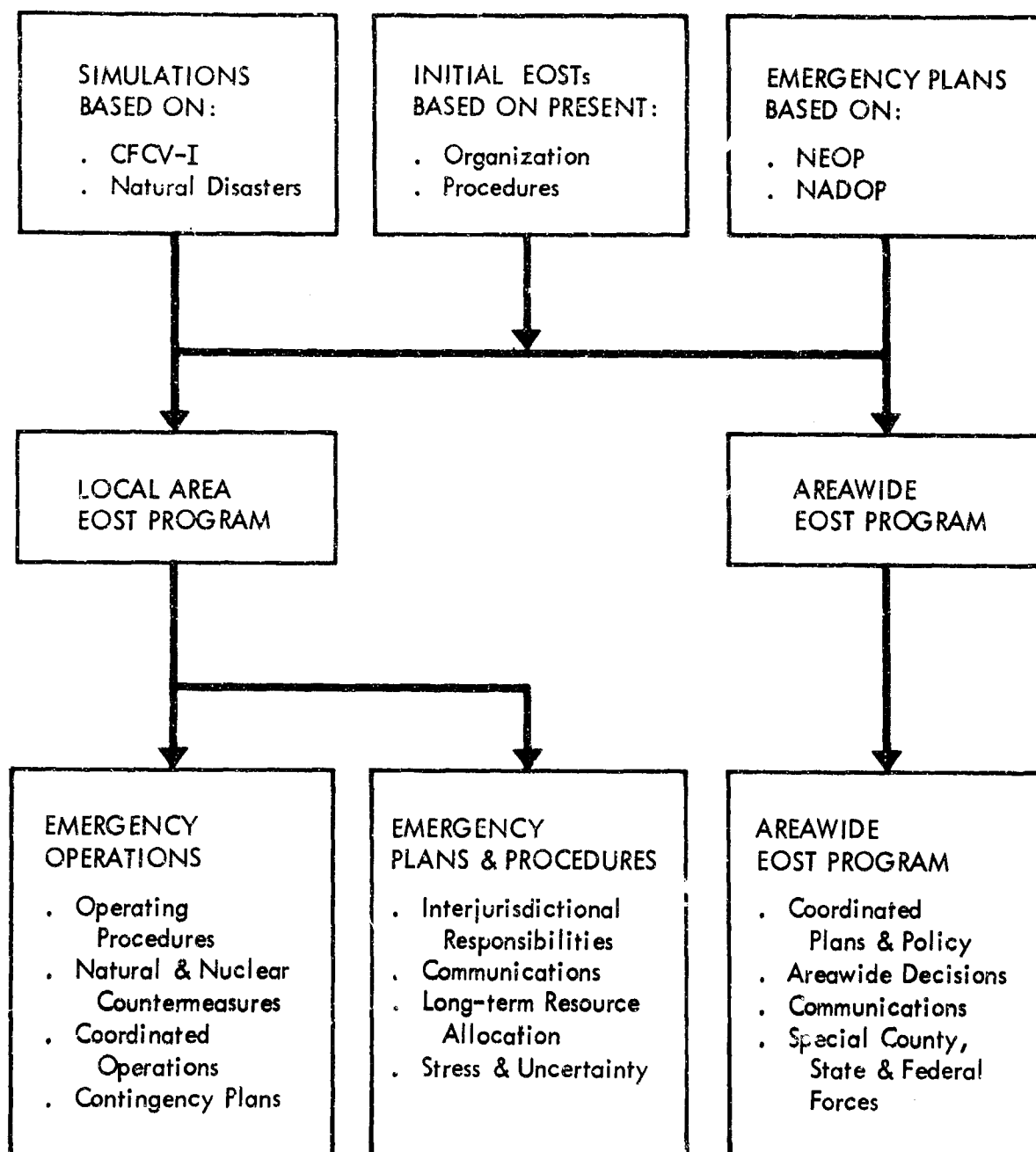


Figure 3. ELEMENTS OF A MODIFIED EOST PROGRAM

for example, RADEF data and analysis, care of refugees, and use of temporary emergency operational personnel. These exercises should introduce the Alpha NEOP and NADOP documents to fill the gap created by the lack of contingency plans.

The policy level exercises should include simulation of the stress conditions imposed by major disasters, and the ability to plan and support operating forces in face of uncertainties and loss of morale. Simulations should also involve the lack or degradation of communications. Resource allocation plans involving longer time periods should be introduced, including interjurisdictional demands and responsibilities. A further content for the policymakers should be learning how to organize to plan for contingencies during the course of the emergency disaster.

The EOST program should also be expanded to include areawide (state and regional level) EOST exercises. In their initial stages, these should relate to and emphasize policy and planning decisions versus operational problems. They should include the stresses imposed by current nuclear war concepts and emphasize communications problems. Ultimately, they should include decision-making across multiple levels of government, involving the special county and state forces (the sheriff and state highway patrol, the forestry service, etc.). Finally, they should include the National Guard and the Army in their civil defense support roles. Here the MACDO NEOP and ADOP plans will apply.

V OUTLINE OF RECOMMENDED EOST PROGRAM MODIFICATIONS

Introductory Statement

- A. The original exploration of EOST exercises was conducted several years ago, resulting in:
 - 1. The implementation of the exercises for local jurisdictions with UEP personnel conducting the training.
 - 2. The publication of the operations and simulations manuals, SM-4.1.1 and SM-4.1.2, in January 1967.
- B. It was noted in the manuals that EOST was designed as a vehicle to meet various possible operating problems and was planned to be modified as operating experience was gained.
- C. Many exercises have now been conducted and much experience has accrued.
 - 1. The overall response has been favorable.
 - 2. Many constructive criticisms have been received from the field.
 - 3. Basic changes have been made in the perceived hazards, in the understanding of countermeasures, and in the civil defense program itself.
- D. Recent evaluation of the EOST program has concluded that:
 - 1. The program is essentially valid and very worthwhile.
 - 2. Specific areas should be modified or extended.
 - 3. An efficient way to introduce the changes is through a supplemental volume to the existing manuals.
- E. This section outlines the recommended EOST program modifications.

Program Objectives

- A. The overall objective of the EOST program is to enhance the capabilities of local and state governments to cope with disasters.

B. More specific objectives include:

1. Exposure to the scope of disaster problems.
2. Recognition of the roles of emergency forces in disasters.
3. Emphasis on the need for preplanning for the commitment of personnel and resources.
4. Derivation of common strategies and operational procedures at all levels and between jurisdictions.
5. Recognition of the need for specific countermeasure training to meet unique disaster hazards.
6. Appreciation of the value of training by simulation techniques.
7. Familiarization of personnel with:
 - a. EOC concepts
 - b. Emergency plans
 - c. Data displays, paper forms, and message flows.

Major Civil Defense Developments Relative to EOST

- A. Estimates of enemy nuclear attack capabilities have been revised, leading to the need for coordinated areawide plans and countermeasures.
- B. Enhanced appreciation of the values and difficulties of EOST procedures has suggested the development of extended programs rather than isolated exercises.
- C. Recognition of the parallel role of training for natural disasters with nuclear disasters indicates a need for expanded subject coverage.
- D. OCD has prepared Master Checklist documents for NEOP and NADOP.

Elements of EOST Program

- A. Program concepts for EOST include:
 1. Separation of operating problems from policy problems.
 2. Simulation of both current enemy attack capabilities and specific natural disasters.

3. Emphasis of unique hazard requirements and interjurisdiction relations.

B. Program elements include:

1. Initial exercises.
2. Local emergency operations.
3. Local emergency plans and policies.
4. Areawide exercises.

Initial EOST Exercises

- A. The first exercise is primarily designed to introduce the EOST program.
 1. Past EOST experience would fulfill this requirement.
 2. The major purpose is to achieve recognition of emergency organization and procedure requirements.
- B. The exercising jurisdiction should select the problem disaster to enhance relevance.
- C. Adaptation of normal modes of operation to the disaster situation should be encouraged, involving:
 1. Utilization of present facilities, personnel, roles, and procedures to the extent feasible.
 2. Supplementation with OCD material only to fill voids and to introduce advanced methods, i.e., NEOP or NADOP.
- D. Time requirement on UEP and local jurisdiction personnel should be limited by:
 1. Preplanning with the civil defense director and key personnel, including derivation of major disaster events and scripting of messages from external sources. (Many of the messages can be common to all exercises or computer derived.)
 2. Convening simulators for only one-half day to indoctrinate them in roles and procedures, as well as to provide the routine message load.
 3. Consolidating the rest of the program to one day for the operations group to include indoctrination, plan, and critique.

- E. Emphasis should be placed on the value of emergency planning, EOC operations, and simulation training as techniques.

Local Emergency Operations for EOST Exercises

- A. Emergency operating problems, procedures, and counter-measures should be emphasized.
- B. The goals should be to develop operating competence for emergency personnel under disaster conditions:
 - 1. Instruction in the format and content of the NEOP/NADOP action item checklists.
 - 2. Adaption of general categories of NEOP/NADOP to specific personnel, resources, and geography of local jurisdiction.
 - 3. Isolation of local deficiencies for remedy by training and resource development.
- C. Emphasis should be placed on the unusual, individual hazards of disasters, not merely on an increased frequency or intensity of normal emergency services, such as:
 - 1. Current estimates of enemy attack capabilities with fallout and mass sheltering problems (see conclusions of Appendix A).
 - 2. Civil disorder strife with harassment by dissidents.
 - 3. Unique problems created by combinations of extreme natural disasters, such as a hurricane and flood threatening epidemic.
- D. The personnel involved are from the operating staffs of the regular emergency services:
 - 1. Supplemented by special personnel (i.e., RADEF) as appropriate.
 - 2. Stressed by interdepartment problems requiring extraordinary cooperation and support. (See L. A. Snell's concepts in "A Long-Range Plan for Development of Increased Disaster Response System Capability," University of Southern California, April 1970.)

- E. In later program stages, operating personnel from adjacent jurisdictions should be involved to:
 - 1. Deal simultaneously with mutual problems.
 - 2. Exercise local communications.
 - 3. Explore operating relationships between local cities, between city and operating areas (MACDO).
 - 4. Incorporate, too, the capabilities of other emergency services in the area, i.e., state or federal forestry, military, and/or industrial security.

Local Emergency Plans and Policies for EOST Exercises

- A. These exercises are to emphasize planning and policymaking under the stresses and uncertainties of disaster conditions.
- B. The ultimate goal is to develop capabilities at local administrative level to deal with disaster imposed hazards which require:
 - 1. The ability to make and to modify contingency plans which are flexible to allow reaction to a dynamic environment.
 - 2. The recognition of possible extraordinary shortages of input supplies and extreme levies on resources from outside requirements.
 - 3. The restructuring of traditional roles and relationships under various emergency power configurations, such as:
 - a. Delegation of traditional responsibilities to others.
 - b. Assumption of broader jurisdictions to replace other losses.
- C. The exercises should involve local decision structure personnel including:
 - 1. Political leaders, executive staffs, and service chiefs.
 - 2. At later exercises, counterpart decision-makers from adjacent jurisdictions to deal with mutual problems.

- D. For content, the exercises should explore policy implications of situations revealed by:
 - 1. Adoption of NEOP/NADOP procedures to cope with disasters.
 - 2. Emergency operations simulations concerning the need for special legal or mutual aid authority, or special emergency capabilities.
 - 3. Areawide planning simulations concerning reactive implications to the local jurisdictions.
- E. Traditionally, EOST exercises have been played in real time. The plans and policy exercises should both skip and fore-shorten game time (and, as feasible, involve more real time) to encompass later exercise periods.

Areawide EOST Exercises

- A. NEOP/NADOP documents integrate local emergency operations plans with the concept of MACDO, which is here taken to be an areawide emergency operations center with jurisdiction approximating an SMSA or a trading area (as defined by Rand-McNally or by the Bureau of the Census Economic Subregions). A viable example of MACDO is the California Disaster Office, Region II, headquartered in an EOC at Oakland, encompassing an expanded San Francisco/Oakland SMSA.
- B. Objectives of an areawide (or MACDO) EOST exercise would be:
 - 1. To introduce and explore EOST techniques and procedures for higher echelon authorities, concurrently with the introduction of the MACDO concepts of NEOP/NADOP.
 - 2. To develop proficiency in the emergency operations functions required to support local jurisdictions, including abilities to obtain and relay predictive intelligence (as with fallout) and integrated damage status reports.
 - 3. To establish procedures and practices compatible with local political, economic, and geographical characteristics to support and supplement local emergency forces effectively during disasters.
- C. Participants for the MACDO EOST exercises should include the areawide civil defense coordinator assisted by appropriate technical staff. Such staff should approximate an actual emergency force as closely as possible.

- D. Local and regional communications are an integral (perhaps controlling) element of MACDO operations. Over the EOST exercise program series, in-place communications should be played to state and regional, as well as to local jurisdictions. Degraded communication links and intelligence should be introduced
- E. MACDO EOST exercises should be coordinated with, and should be an extension of, local emergency plans and policies exercises. Areawide exercise content should:
 - 1. Be based on the same (perhaps extended) disaster simulation that is used at local levels.
 - 2. Exercise intelligence data generation and communication in the same formats that are used for input and output by local government.
 - 3. Utilize extant (not simulated) resource data sources. This imposes a requirement for real communications between the EOC and operating units who often will be the only data banks.
- F. MACDO EOST exercises should face the often noted problems of command and control as an integral element of the exercise.
 - 1. Problems involving competitive requirements for personnel and resources should be introduced to prompt local jurisdictions to establish meaningful mutual aid agreements and compacts.
 - 2. Problems relating to losses of jurisdiction and constituency control (evacuation from flooded area) should be studied to define needed emergency delegations.
- G. The MACDO EOST exercises are an appropriate echelon to introduce operating coordination to many state and federal agencies, including the military forces. Mutual planning could be fostered by joining the EOST exercise program with military exercises, such as Orbit-Red of the Sixth U.S. Army or Operation Cable Splicer of the California State Military Forces.

Appendix A

NATIONAL ATTACK PATTERN

Present EOSTs do not employ a national attack pattern. Rather, the persons structuring the simulation select a ground zero and yield for each exercise. They usually designate a single, logical target point somewhat remote from the exercise area. The point is normally upwind from the exercise area, and the weapon is surface burst so that fallout becomes part of the exercise problem. Fallout arrival times and intensities are calculated from a scale map overlay which is available to the simulation director.

The earlier work on the transattack scenario (see Appendix B, New Orleans Transattack) used the Civ-Log attack pattern which was selected as the base threat for the OCD Five City Study. Working from that national attack pattern it was possible for the author to assess direct effect damage, as well as to derive locations, intensities, and times of arrival of fallout. Damage to nationwide communications was introduced. This made it feasible to simulate EBS and news media environmental messages from across the country and attack data from NORAD. These data are desirable in introducing the realism of a nationwide attack to the EOST exercises and in allowing messages concerning the attack progress to reach the local area. In addition, the time sequence and locations of weapon arrival introduced significant uncertainty and stress for the players in the transattack scenario exercise.

These considerations lead to the desirability of introducing a nationwide attack pattern to the EOST program. The Civ-Log attack used earlier was considered obsolete in terms of current strategic forces. OCD selected the CFCV-I pattern which more closely represents current capabilities.

Counter Force - Counter Value I

A total of almost 1,300 ground zeros were involved in the CFCV-I pattern. These arrived during a 13-hour time interval after first launch with the first ground zero 30 minutes after launch. The CFCV-I attack delivered its weapons in four salvos, and almost 75 percent of its weapons were expended in the first 25 minutes after the first impact.

Sample Area

In order to analyze the characteristics of the attack relative to the EOST exercises, an area comprising the states of California and Nevada was selected for detailed analysis. This area contains approximately 10 percent of the total population and involves a little under 9 percent of the total number of weapons delivered.

Table A-1 compares the distribution of weapons by yield and arrival times over the total United States and the selected area. Several distinctions are immediately apparent. First, no 20-megaton weapons are delivered to the sample area. Second, no weapons are delivered during the intermediate time periods. Further, a high percentage of weapons are of the one-megaton class. Nevertheless, the consequences of the CFCV-I attack to the EOST exercises are so significant that they override the distinctions.

Figure A-1 shows the degree rectangles of the selected area. A degree rectangle is here defined as the area of the quadrant lying north and west of the intersection of the longitude and latitude degree lines. The selected area contains 80-degree rectangles, approximately 9 percent of the total land area of the United States. For the latitudes in the United States these rectangles are approximately 70 miles north to south and between 50 and 60 miles east to west. Therefore, each degree rectangle has an area of approximately 4,000 square miles.

Figure A-1 shows the total number of weapons detonated in each degree rectangle. The numerals in parentheses indicate the number of two- and three-megaton weapons detonated during the 12th hour after launch. The shaded squares contain the urbanized portions of metropolitan areas of San Francisco-Oakland, San Jose, Sacramento, Stockton, Reno, Las Vegas, Los Angeles, and San Diego. Eighty-nine of the 113 weapons delivered in the area are in these 13 squares. Needless to say, the urban areas involved would be largely devastated. Another interesting aspect of the attack is the placement of weapons along the West Coast. The figure shows that only three of the West Coast squares do not receive at least one weapon. For two of the three squares there is a weapon immediately east of the coastal square. In the last case, both the square and the one immediately to the east are in the sparsely populated area of Mendocino County. With the high incidence of prevailing winds from the northwest and southwest quadrants, it appears likely that over 80 percent of all the squares in the two-state area would be affected by significant levels of fallout.

Figure 2 and the discussion in Section II illustrate the intensity of the attack on metropolitan areas.

Conclusions

Use of the national CFCV-I attack would allow the following elements to be introduced to the EOST exercises:

1. The initial half-hour between launch and first weapon arrival could be used for NAWAS, EBS, and news media broadcast messages. These messages would set the stage of the massive nature of the attack and introduce considerable stress to the players. Note that prior to the first ground zero, the aggressor would have over 900 warheads in the air. The concept

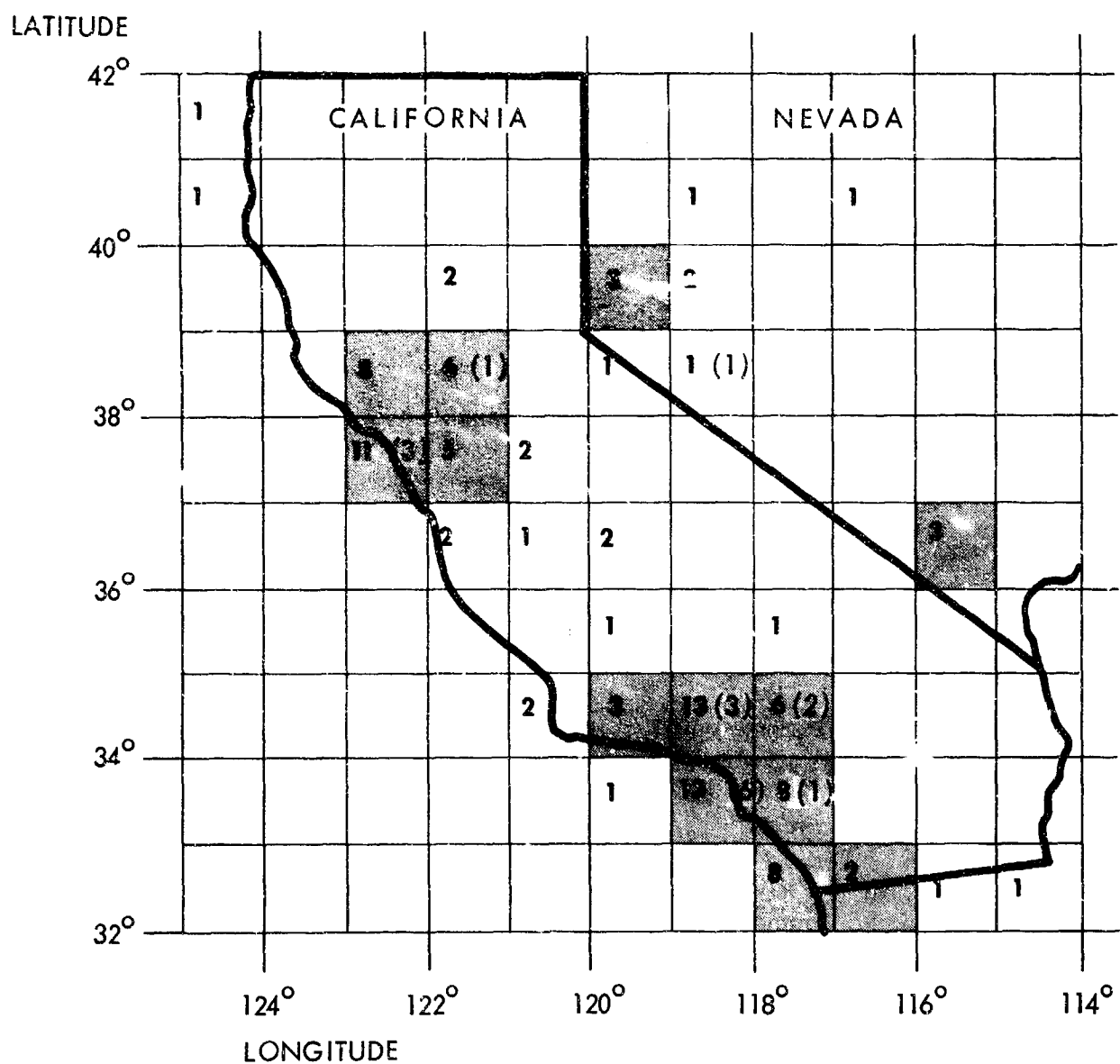
Table A-1

TOTAL AREA VERSUS SELECTED AREA - COMPARISON OF
DISTRIBUTION OF ATTACK WEAPONS BY
YIELD AND BY ARRIVAL PERIODS
(Percent of Total Weapons)

Yield (MT)	Total Area				Total
	0030-0055*	0645-0700	1115-1130	1205-1250	
1	58%	--%	--%	--%	58%
2	--	7	--	10	17
3	6	2	5	5	18
20	<u>7</u>	<u>--</u>	<u>--</u>	<u>--</u>	<u>7</u>
Total	71%	9%	5%	15%	100%

Yield (MT)	Selected Area				Total
	0030-0055	0645-0700	1115-1130	1205-1250	
1	85%	--	--	--%	85%
2	--	--	--	8	8
3	--	--	--	7	7
20	<u>--</u>	<u>--</u>	<u>--</u>	<u>--</u>	<u>--</u>
Total	85%	--	--	15%	100%

*Time after launch.



NOTE: Bold face numbers in the squares are total ground zeros.
Numbers in parentheses are ground zeros after the first salvo.

Figure A-1. GROUND ZEROS OF CFCV-I ATTACK - California and Nevada

is as appalling as the World War II concept of blackening the skies over Berlin with bombers.

2. At least in the selected sample area, every location would be within visible, audible, and earthshock range of a most fantastic display of physical phenomena from 30 to 55 minutes after attack warning. While the EOSTs are played in real or simulated EOCs which might be impervious to light and sound, this 25-minute period should be saturated with messages regarding the physical phenomena. Again this would create an air of uncertainty regarding immediate survival.
3. The saturation nature of the attack against the metropolitan areas would make the play academic for many communities. This problem would be eliminated by arbitrarily excluding weapons which would have immediate effects upon the exercising jurisdiction. The arrival of weapons in adjacent areas would be the basis for calls for mutual aid, and would introduce the necessity to provide for injured and uninjured refugees.
4. The hiatus period after the arrival of the first weapon salvo could be punctuated by damage reports over EBS and by media news regarding the conduct of the continuing war. Perhaps it would be fitting to end the EOST play with an EBS or NAWAS message of the attack resumption. Because the play of the EOSTs normally lasts less than four hours, the weapon arrivals from 0645 on would have to be of foreshortened time.
5. The blanketing effect of fallout from the multiple weapons would present a significant analytical problem at local level. As noted elsewhere, RADEF officers at local level have problems dealing with single remote weapons, so it is probably unrealistic to expect that the local RADEF officer will be able to handle these blanketing effect problems. Either in an exercise or in a real sense, this condition suggests that external messages should be used which would allow prediction of fallout arrival to be available from some central computing and analytical source. At least the EOST should allow, or encourage, local officials to inquire for fallout predictions (as in the NEOP Master Checklist). Should these data be provided externally, messages could be simulated in a rather arbitrary manner for exercise purposes. (Would the almost simultaneous bursts produce an exaggerated pattern of local hot spots? Is this a valid point to introduce into the EOST play?)

Summary

In summary, it appears that the CFCV-I national attack pattern is a vehicle to enhance the realism and sophistication of the EOST exercises.

While it also may introduce significant difficulties for the exercise director, it is recommended that the data be introduced into the EOST programs in the manner suggested in the foregoing paragraphs.

Appendix B

SUMMARIES OF EOST DATA SOURCES

In deriving the recommendation for changes in the present EOST, the author investigated many data sources. It is obvious that for a program of this size, many readers of this report will have partial exposure to the author's sources, as well as to experiences unavailable to him. Much of this experience is not contained in formal reports, but represents direct observation by the evaluators. In addition, even those sources which are in print may be remote and difficult to obtain by many evaluators of this report. Therefore, the most important of the author's source materials are reproduced here in brief form. In each case the summaries are supported by more extensive documents or notes.

The data included here are summaries of four EOST training sessions which were attended by the author; one transattack simulation exercise which was conducted by the author; one extensive report of an EOST session which was run independently of the UEP; and several evaluated documents prepared by others. These data summaries are directed to the research problem in hand--a critical review leading to modified EOST content and procedures--and purposely eliminate or de-emphasize general material which is supportive and laudatory to the present procedures. In other words, the data are deliberately filtered to be supportive of the program modifications. Throughout the earlier evaluation and in drawing the conclusions related to change, the analyst has carefully preserved the fundamental attributes of the present system.

Summary Reports of FY 1969 EOST Program

Background

During FY 1969, 280 EOST courses involving over 11,000 participants were conducted under the auspices of the civil defense UEP. Data regarding these exercises were available to the author from the "Newsletter" published by the UEP at the University of Kansas. While most of the material reported consisted of laudatory, appreciative, and procedural comments, there were recurring critical theses. Following is a summary of paraphrased material regarding those critiques. The material should be regarded as indicative only, because there was not a sufficiently rigorous format to permit quantitative tabulation of the typical comments.

EOST Preparations

- July - Belen, New Mexico: Noted limited preparation time and the civil defense director became ill.

- January - Corpus Christi, Texas: A quality EOS cannot be developed and conducted in these population areas in the four man-weeks of time suggested in OCD contract guidance.
- May - Fort Wayne, and Allen County, Indiana: Four man-weeks are not sufficient preparation time.

EOST Procedures

- August - Grand Island, Nebraska: Civil defense philosophy and practice should be explained.
- August - Washington (state): Communications capabilities are not defined in the EOSTs.
- December - Prescott, Arizona: There is a need for annual practice sessions.
- July - Lewiston, Maine: The EOCs are a unique method of putting common sense and practicality into civil defense functions.

EOST Content

- October - California: An urban unrest seminar was interesting and the subject may be useful as EOST content.
- December - Arkansas: Contents of both nuclear and natural disasters are needed.
- December - Waterbury, Connecticut: The tornadoes and floods in the EOSTs helped the exercise.
- February - Ogallala/Keith County, Nebraska: Will follow with a tornado exercise.
- April - Oklahoma: There is a need for increased communication and coordination.

EOST Intergovernment Coordination

- July - Kauai, Hawaii: The question was raised of who has authority if Kauai should have the only operating government in the state.
- July - Walla Walla, Washington: Public information officers and legal advisors were helpful. The latter revealed sticky legal problems.

- November - Cecil County, Maryland: Cooperation between state, county, and local officials worked well, particularly for law enforcement.
- March - Eugene/Lane County, Oregon: There were problems of coordinating operations. A strong tendency for individual agencies and organizations to function independently.

EOST Extended Area Coordination

- December - Roundup, Montana: Several counties were involved and they managed to work out coordination problems.
- February - Hawaii: Good cooperation between military and civil government was achieved.
- April - Effingham, Illinois: The city/county EOST provided a good basis to achieve cooperation between local areas.
- June - Cowlitz, Washington: The combined city/county operation worked well.

EOST Follow-on Activities

- October - Maine: There is a need for combining instruction courses of all types.
- February - Salisbury, Maryland: There is a need for training courses for shelter managers and radiological monitors.
- April - Centreville, Maryland: There is a lack of shelters and trained managers.
- June - Portland City and County, Oregon: Larger area considerations should be added to the EOSTs.

Sacramento City and County EOST

Background

This EOST was a combined exercise with personnel from both the city and county of Sacramento participating. The population of Sacramento County is 600,000. The situation in this area is somewhat unique as the northern suburbs of the city are in unincorporated county land, and the residents comprise a majority of the urban population of the county.

Because of this contiguous location of population, personnel in each of the services are well acquainted with their city and county counterparts. The exercise was held during the week of June 8-12, 1970, in a high school lunchroom and auditorium. The Sacramento EOC was unsuitable because it was being used as a storage area (and it was not air conditioned). The chief political officer of the county, who has been an active supporter and coordinator of civil defense activities, was unable to attend the session at the last minute because of sickness. His place was taken during the play by an experienced and able assistant. The author attended the exercise and the preparatory sessions. The staff of the USC School of Public Administration conducted the training. The administrative arrangements were made by the Sacramento Civil Defense Director, Kenneth C. Johnson, who is the coordinator for the Sacramento Operational Area. Almost 100 people participated during the exercise.

Simulation Outline

6/11/70	1600	-	Declaration of Condition 2.
6/12/70	0900	-	Declaration of Condition 1.
	0905	-	Student demonstration at State Capitol.
	0915	-	Explosion at Continental Chemical Plant releases poison gases and liquids.
	0930	-	Tanker truck accident.
	0945	-	One hundred revolutionaries take water treatment plant.
	1000	-	Attack warning via NAWAS.
	1005	-	Explosion at Alberta Substation.
	1015	-	NUDET reported at Travis Air Force Base.
	1030	-	Fire in resources building shelter with 36,000 shelterees.
	1045	-	Fallout at 5 r/hr throughout the county.
	1100	-	707 airplane crash at Sacramento Airport.
	1115	-	Ruptured pressure line at gasworks.
	1130	-	End of exercise.

Major Play Developments

- There were 14 pages of tab runs of shelters. These were not totaled to complexes and had to be arbitrarily combined to be manageable.
- The RADEF data were provided in overlay form and tab run printouts by the trainers.

- At first fallout arrival there was a recommendation that everyone continue operations until more definitive data were available. It was announced at this time that the maximum allowable dose was 25 r/day or 125 r/week.
- The message comptroller acted as a distribution point only. He made no attempt to coordinate or edit messages.
- The simulation group prepared emergency messages readily.
- The disadvantage of operating in a school auditorium was compensated for by the large space available, which allowed total flexibility of seating arrangements.
- An initial tape recording by a local announcer effectively started the exercise and reported the background data.

Conclusions

- There were no problems or concerns about city/county relations because of established procedures and personal contacts.
- The inventory of resources in written form was not used. The procedure was to find and allocate resources on a person-to-person basis.
- The student and revolutionary actions resulted in a request for 10,000 National Guardsmen. Possibly only 500 would be available. This raised the question as to the overall role of the federal government.
- On receipt of warning all agencies told their personnel to "go to shelter." Later these orders were countermanded by specific instructions to perform services.
- Law enforcement and fire were the best prepared and coordinated services. They have similar exercises routinely.
- Coordination difficulties increased as people who do not normally function in peacetime emergency operations became involved.
- It was noted that post-disaster problems were not explored, but they should be.
- The three hours of the exercise do not use up resources of any agency.

- A need was cited for an appropriate, permanent EOC, where service chiefs could sit down together.
- In real life they do not have a common communication system, but they do have cross-talk links.
- This was the second exercise for the group. The members felt that it was better than the first exercise and that they were benefiting by the experience, particularly in handling internal paper work.

Palo Alto EOST

Background

The Palo Alto EOST was conducted during the week of June 22-26, 1970. About 50 local people participated, including the city manager. Vince Connors of the USC School of Public Administration conducted the training, assisted by other members of the USC staff. Dale A. Hooker, the Palo Alto civil defense coordinator (from the Fire Department) was in charge of the arrangements. The author observed the entire EOST. The Palo Alto EOC is a long, narrow room in the basement of the new City Hall. It is designed to serve alternatively as a firing range. The EOC and adjacent Communications Dispatcher Center are designed with a 100 protection factor and a four-hour fire rating. The city has an emergency planning document with department annexes.

Simulation Outline

6/22/70	1030	- Declaration of Condition 3.
6/23/70	1030	- Declaration of Condition 2.
6/25/70	0900	- Declaration of Condition 1.
	0905	- Explosion at Hewlett Packard Plant.
	0915	- Bus-chlorine truck collision.
	1000	- Attack warning.
	1010	- SDS demonstration.
	1015	- NUDET at Treasure Island.
	1017	- Power failure.
	1030	- MATS plane crash.
	1040	- Fallout arrival.
	1055	- Fire threatens 3,000 persons in shelter.
	1115	- Gravel truck accident floods underpass.
	1130	- Exercise ends.

Major Play Developments

- There was an issue about role of operations chief and message coordination. The sequential handling causes delays and confusion.
- There was an issue on role of service agencies (transportation, purchasing, etc.) as to who controls resources--for example, ambulances are controlled by transportation, dispatched by police, and required by medical.
- Confusion results from the use of oral versus written messages, particularly with the emergency report forms generated by the players.
- Generation of simulation messages was accomplished readily.
- City manager ordered everyone to shelter on arrival of fallout. Service chiefs kept operating for emergencies. Uncertainty about fallout effects.

Conclusions

- The city manager would have preferred a "higher probability emergency" to a nuclear attack.
- Fire, police, public works, and similar service personnel are accustomed to working together and their relations were smooth. Relations of medical, welfare, and RADEF personnel are more remote and coordination was more difficult.
- The requirement for more RADEF knowledge was apparent to the service chiefs. This includes exposure times and dose levels.
- Shelter management and control will be critical, and they do not have adequate real capabilities.
- Service chiefs were bogged down by paper work. They want separate logs, and a secretary to handle messages.
- The long, narrow EOC created operating and coordination difficulties.

San Jose EOST

Background

The San Jose exercise "Operation Rainshaker" was held in the San Jose EOC on March 31, 1970. It was conducted by the city's civil defense organization and the emergency operating staffs without the assistance or auspices of either the OCD or the USC School of Public Administration. There had been an earlier EOST conducted by USC which was not highly regarded by local officials. Evidently this low regard stemmed from a lack of acceptance of the nuclear attack situation as well as an overabundance of subsidiary problems which caused a widespread feeling of unrealism. This summary report is based on documentation of that play. The San Jose EOST is in a separate reinforced concrete building adjacent to the City Hall. It is well equipped and is the center of a traditionally active and able civil defense and city organization.

Simulation Outline

- | | | |
|--------------------|------|--|
| 3/27/70 | 1200 | - Civil defense headquarters goes on 24-hour duty. |
| | 1800 | - Gale winds and rain have forced TV stations in San Jose off the air for periods of several hours. |
| | | - Winds of 110 miles per hour were measured near Los Gatos with much damage to houses and commercial developments and many power failures. |
| 3/28 to
3/30/70 | | - Rivers in the center of the city are flooding and people have been evacuated. The severe weather conditions continue. |
| 3/31/70 | 0830 | - Anderson Dam is full and spilling at the rate of 4,000 cubic feet per second. This is flooding the highways in and around San Jose. |
| | 0915 | - Earthquake occurs along the Hayward and Calaveras Faults. Reports indicate many injuries. |
| | 0945 | - An earthquake occurs along the San Andreas Fault, but there is no local damage. However, the communication repeater station on Mt. Chual is out. |
| | 1000 | - Fire, injuries, and damage are occurring in the city. Telephone communications are |

partially lost. Electricity and gas services are also damaged.

- 1015 - Earthquake is felt in Mountain View and Alviso.
- 1030 - General subsidence of land in the Alviso area.
- 1045 - Anderson Dam is gone and there is extensive flooding.
- 1115 - Alviso and Agnew are inundated with flood waters.

Major Play Developments

- The purpose of the exercise was to determine the extent of interservice coordination as applied to this specific disaster incident.
- Public works personnel did not participate in the briefing sessions and did not submit responses of their actions. This reduced the effectiveness of the EOST.
- The exercise used two operations chiefs who were responsible for coordination of the responses of the service chiefs. This led to difficulties in message distribution.
- Coordination between the service chiefs was in most cases accomplished by written messages. This procedure resulted in a "paper mill" atmosphere.
- There was a surprising lack of seriousness in many of the participants, even at the climax of the exercise.

Conclusions

- More outside agencies should have participated in the operations because of the broad extent of the disaster.
- The role of the chief of operations should be vested in a single person, and his duties and authorities should be clarified.
- The city manager should not participate in the conduct of emergency operations, but should have an overseeing role so that he can conduct advanced planning with department heads and adjoining jurisdictions.

- Too much paper work was generated. This problem should be resolved by more oral coordination.
- The display log should be revised and abbreviated.
- The operations chief should make flash, oral announcements as well as status reports to keep all participants up to date.
- The same type of exercise should be used in the future, but with more preplanning and perhaps a partially different cast so that more in-depth training could be provided. (It was recognized that this would continue to preclude participation of the USC UEP personnel.)

Arizona EOST

Background

This EOST was conducted for personnel from the various state agencies who would have an emergency planning role in the event of nuclear disaster. More than a dozen representatives participated from the state departments. The exercise was led by Colonel Carl N. Smith, Head of the Arizona Civil Defense and Emergency Planning Department. The program, set up by E. H. Wilkie of the University of Arizona Continuing Education Division, represented an attempt to adapt the EOST exercise techniques to the higher echelon government problems.

The exercise was conducted in the state EOC, which is in the basement of the capitol building. This EOC is below grade, with protection factors up to 1,000. It is located adjacent to an emergency communication center with NAWAS and EBS tie-ins as well as communications to various state agencies and to county EOCs. It is the planned operating site in case of nuclear emergency.

Simulation Outline

9/15/70 0800 - REDECON 3.
 9/16/70 1600 - REDECON 2.
 9/17/70 1420 - Checkerboard.
 REDECON 1.
 1500 - A NUDET is reported at Hoover Dam. Fires are out of control in the Weaver Mountains. There is heavy flood damage in Pinal, Pima, and Santa Cruz counties. All traffic to El Paso is halted by a NUDET. The natural gas line from El Paso has ruptured.

9/18/70 0700 - Fallout is reported at Flagstaff.

0800 - The Four Corners Power Plant is out of commission.

0900 - Flood waters have reached Yuma and thousands of people are seeking shelter.

0915 - Local governments are reported to be getting people into shelter. Flagstaff is the only major city affected by fallout.

1005 - All land transport across the Colorado River is out. Yuma is under water.

1100 - The exercise is terminated.

Major Play Developments

- The flooding from the Hoover Dam catastrophe was extensive all the way to Yuma and inundated the Imperial Valley in California.
- Fallout was represented in a fanlike pattern extended north and east of Flagstaff.
- Messages were prepared by the UEP coordinator and by the simulators to exercise each department of the state government.
- There were significant problems and interchanges involved between the several departments. These often required coordination and were handled effectively.
- There was extensive coordination between the civil and military representatives at the exercises. The military was called upon for reconnaissance work, and the civilians were called upon to provide transportation (road) routes through the fallout and flooded areas.
- A technique was employed whereby players phoned their operating departments to get required background information.
- Aside from the telephone contacts between the players and their home departments, communications were only simulated.
- For most of the players it was a new and revealing experience.

Conclusions

- The response to fallout arrival in the northwest portion of the state was a blanket order to keep everyone in shelter and to prohibit any movement within or through the area. This caused considerable problems because of the fires in the mountains, the flooding of the river, and the sabotage at the Four Corners Power Plant. Many people on the south rim of the Grand Canyon also were isolated.
- State level planners appeared to be totally responsive in the sense of answering questions and making recommendations for other operators.
- In no case was there evidence of an operational plan that attempted to specify actions or to anticipate continuing or future disaster.
- It was feasible to adapt the general concept of simulation as reflected by the EOST procedures to the state level exercise.
- The message formats and the content of the problems were significantly different in scope, but similar in content to those observed at local levels.
- The players remarked that the logboard was not used and that briefings by the operations officer would have been desirable.
- The passive role of the operations coordinator was noted, especially in relation to the need for more information and intelligence on the overall problem as a basis for the players' individual decisions. They noted the lack of anticipatory actions.
- As mentioned, communications were not played. The participants were very concerned about how they could actually function in a real emergency.
- It was agreed that the time period of the exercise was much too short. However, it was further noted that the state governor could not compel people to contribute time equivalent to the 51-hour Orbit-Red Exercise which is being planned by the military.

New Orleans EOST

Background

The New Orleans EOST was held in their EOC on May 21, 1969. This exercise was part of the Region V Training Program, and represented the largest city problems attempted within the region. The operation was conducted by E. A. Simon and the Louisiana State University civil defense extension program. The LSU group was assisted by personnel from OCD Region V, the Louisiana Civil Defense Office, and the New Orleans Civil Defense Office. The New Orleans EOC is a large, separate, reinforced concrete structure under an earth overburden. The exercise involved over 70 participants and was preceded by three days of training and preparation. The author attended the exercise and preparatory session. The exercise itself presented no unusual difficulties, except for overcrowding in the operating control room. In a real emergency this density would be reduced because many of the people would be resting and more would be dispersed to peripheral work areas.

Simulation Outline

- 5/21/69 1330 - Checkerboard.
- 1335 - A NUDET is reported at Hammond, approximately 50 miles northwest of New Orleans.
- 1350 - External power is blacked out at the EOC.
- 1400 - Traffic is blocked in the commercial areas.
- 1405 - Fire starts near Army Port of Embarkation (large shelter area).
- 1435 - Fallout arrives in New Orleans.
- 1440 - A major fire starts in the Charity Hospital.
- 1520 - Fallout peaks over most of the city at over 100 r/hr.
- 1545 - Exercise ends.

Major Play Developments

- The play involved the emergency and safety forces of the city (police, fire, medical, welfare, rescue, RADEF monitoring, etc.) and gave them an environment to face operational problems and to make decisions.
- To exercise each of the participants the total schedule of intracity problems was (perhaps unrealistically) large.

- The time constraints for the play tended to force events to happen quickly and in a sequence which precluded significant uncertainties and extracity considerations.
- No issues from outside of the city were relevant to the exercise.
- Until the arrival of fallout, no problems within the city were related to the attack.
- Within two hours after the start of the exercise, fallout intensities in New Orleans were over 100 r/hr, and all forces were ordered to shelter. This effectively terminated the game.

Conclusions

- The now classical plethora of peacetime problems facing large central cities reappears with urgency during the transattack period. Reassuringly, the adequacy of public safety forces (police, fire, medical, RADEF, welfare, etc.) to deal with intracity problems is impressive, especially when they are supplemented with state, National Guard, and military forces.
- Extracity and intercity problems tend to be ignored, but they keep reappearing with increasing frequency and intensity. This generalization applies to organization and management as well as to resources, equipment, and personnel.
- The present EOST exercises are an effective way to expose local safety personnel to the unique problems and hazards of nuclear attack. EOST exercises are played at a problem level structured to interest and train operating personnel.

New Orleans Transattack Exercise

Background

The New Orleans transattack simulation was played in the New Orleans ECC on May 27, 1969. The objectives, procedures, and content of the transattack simulation were significantly different from those of the EOST. The transattack simulation was derived and presented by the author, assisted by members of OCD Research. The objective was to determine the status of the city of New Orleans approximately six hours after the receipt of warning and prior to any significant attack effect on the city itself.

Message and problem content was centered on areas outside of the city boundaries, with no major emergencies within the city itself. The downwind fallout patterns from bursts at Biloxi and Gulfport introduced considerable uncertainty for the players as to the nature and intensity of the threat. Stress was put on the players by extensive reports of the national attack and information regarding the continuing threat.

The Civ-Log attack pattern and the prewarning scenarios of the Five City Study provided the reference base to study the transattack environment. The Civ-Log attack is time-sequenced with the early (first three hours') weapons delivered by missiles primarily against military targets. Then there is a two-hour lull, followed by an air-breathing threat directed primarily against the cities. This continues for another two hours at high density and for several days on a sporadic delivery basis. Thus, the Civ-Log attack emphasized intercity/regional problems over a relative long time span. This environment posed policy--not operational--questions, such as whether to send support from New Orleans to Gulfport/Biloxi, or whether to retain resources within the central city. Other and related policy questions dealt with refugee control, concentration versus decentralization of resources, regional and state government considerations, management in the face of uncertainties of catastrophic consequences, and selection and interpretation of relevant data from multiple and sometimes contradictory sources.

The New Orleans transattack simulation play was designed to emphasize these issues. It was conducted for a relatively small group. Most decisions were made by the mayor with assistance from the civil defense director and the fire and police chiefs. Thus, to the extent that the EOST overstated intracity problems, the transattack simulation understated them. There were no significant fires, runaway barges, traffic blockages, riots, or the like, within the city.

Simulation Outline

- 8/24/70 2022 - Air raid warning.
 - Move to shelter.
 - NUDET and other reports of attack on northern CONUS military bases.
- 2101 - Mobile burst observed.
- 2107 - Keesler (Biloxi) burst observed.
 - Keesler burst heard and felt.
 - Wind at 21 knots from northeast.
 - NUDET reports on Mobile and Keesler confirm large size bursts and ground bursts.
 - NAWAS and other reports of destruction and refugees on Gulf Coast.

- Continuing NUDET reports.
- 2200 - Fallout hazard reported west of Keesler in Gulf.
- 2240 - News services report 200 missiles with megaton warheads have hit CONUS military bases.
- 2300 - Fallout hazard reported approaching New Orleans.
- 2316 - Sky glow from Ft. Polk, Jackson, and Elgin weapons observed.
- 2330 - NUDET reports that Ft. Polk, Jackson, and Elgin weapons are large air bursts.
- 2350 - News services report missile attack quiet with last weapon arriving at Miami ten minutes earlier. Attack avoided most major cities.
- 2400 - Fallout hazard reported 20 miles east of New Orleans.
- News reports of fallout, destruction, and casualties.
- 8/25/70 C100 - Light fallout arrives New Orleans from the east.
- 0150 - NUDET and news service reports renewed attack on state of Washington.
- 0200 - New Orleans under light fallout.
- 0230 - NUDET and news services report most major cities in northern CONUS under aircraft attack.
- National communications fragmented. Those left are saturated.
- 0300 - City target attack reported extending south.
- 0310 - New Orleans weapon.

Major Play Developments

- New Orleans officials did not show particular interest in reports of remote damage except to express sympathy.
- Damage reports of closer targets evoke strong emotional response and consideration of postattack aid, but for the long term only.

- There was an immediate concern about fire and accidents in adjacent local areas, mainly from the standpoint of damage control for the central city.
- There was great concern about radiation. The maximum dose of 125 r/week was considered absolute.
- The only concern regarding people was to get them and keep them in shelter and to avoid radiation contamination.
- Administrative matters posed few problems for city officials. They acted in a conservative manner, especially in their concern to preserve the integrity of the city public service forces.
- They gave very little priority to requirements for mutual aid support to areas outside of their jurisdiction. They stated clearly that their first priority was to utilize and conserve resources within their jurisdiction for their own constituents.
- Intracity traffic control presented only routine problems. Because they retained all their forces and resources within the city there were no external control problems.
- City officials considered damage and injury control a local jurisdiction problem and showed no inclination to send personnel or resources outside the city to help others.
- Fire and police forces would patrol the city to control damage and injuries, but not at the expense of significant radiation exposure.
- They regarded shelter complex managers as key personnel for population protection and control, and in that role as vital communications intermediaries. They would utilize shelters for constituents first and would grant only excess capacity for outsiders. They were concerned that the shelters not be overcrowded or contaminated by late arrivals.

Conclusions

- From the mayor down it is clear that city personnel have a strong allegiance to their jurisdiction and constituency. Their control is an intracity one. Moreover, their autonomy in intracity affairs is unique and unambiguous. Only by declaration of emergency powers, such as martial law, can state or federal government pre-empt local authority.

- In the transattack environment, the extracity problems and uncertainties led to a mustering and conservation of resources to deal with future intercity and intracity problems.
- There remains a set of very real regional and intercity problems which were not addressed by the exercise. This suggests that exploration of comparable endeavors for extracity and intercity problems should be made for regional and state governments.
- Transattack intracity problems were relatively easy for the operating personnel, who responded by conserving their forces in anticipation of the possibility of more severe problems later in the attack. Hence, while the external environmental data from the transattack scenario would add to the interest and realism of the EOST, it would contribute little to the training for intracity operations. Moreover, it would have the disutility of consuming preparation and play time.
- There is a subtle issue of the interactive roles between the central city policymaker (the mayor) and his counterpart in state and federal (regional and national levels) government and military commands. The mayor limits his purview of problems to his jurisdiction and his constituency, and he considered these his unique and exclusive preserves. The extracity problems of the transattack environment scenario had little more impact on the mayor and his staff in their policymaking role than they had on, say, the police chief in his operating role.
- Political jurisdictions and constituencies are bounded into smaller and less flexible units than the functional problem (or threats) which plague them.
- Higher echelon government pre-emption of local authority to accomplish solutions in an emergency role is no panacea. Local organizations and resources are unique and dedicated to the local area served.
- The high density of people and resources in central cities causes concomitant densities of problems in emergencies, yet the city government has a unique capability to handle its own problems. Perhaps the approach to broader problems should involve only government with broader purviews.

USC EOST Evaluation Report

Background

In June 1969, G. W. Combs of the Civil Defense Training Program of the University of Southern California, under the direction of L. A. Snell, prepared a memorandum report evaluating four EOST exercises. These exercises had been held in FY 1969 in the California cities of Glendale, South Pasadena, San Jose, and Pomona. While the emphasis of his evaluation was on the reaction of participants, the critique sessions, and the after-action summaries, his comments were well thought out and documented. In the following paragraphs, the author has condensed Combs' conclusions and recommendations.

Conclusions and Recommendations^{1/}

1. The CDTP staff should re-define the objectives of an Emergency Operations Simulation exercise . . . The absence of succinctly stated objectives by the various principals involved in the training process: 1) impedes the measurement or evaluation of EOSTs, and 2) prevents the EOST trainer from accurately conveying to the trainees the objectives of the exercise.

Evaluation can not take place without a stated set of objectives and goals, indeed setting or formulating the objective is half the battle of evaluation . . .

2. EOST objectives should be transmitted by the trainer to the trainees. They should be more than simply transmitted, their importance and the need for them should be stressed and emphasized. The trainee should internalize these objectives and realize their importance. I say this, because most of the trainees looked upon the exercise as a test. In order to effectively implement systems training, the trainees should not have this notion.

3. The emphasis of training should be altered. Over half of the participants stressed the need for further training. Perhaps they really meant more effective training. There should be an emphasis through a special session or other means for acquainting or re-acquainting the RADEF personnel. The general group should be made to realize that there are experts in the room who will advise them concerning radiation and fallout. Perhaps it would also be good

^{1/} Gary W. Combs, Campus Memo, EOST Evaluation, Institute for Civil Defense and Disaster Administration, School of Public Administration, University of Southern California, June 1969, pp. 22-26.

to brief them on radiation and fallout . . . It should be emphasized that adequate feedback is very important. The concept of the simulators representing both the communications center and the field should be better explained to the simulators. They should be encouraged to use the phones for verbal inputs and feedback.

4. The USC team should work closer with the civil defense director prior to an exercise. The progress the civil defense director is making towards the preparation of the resources manual and the formulation of a training schedule should be constantly checked. In many exercises the resources manual was greatly insufficient and the exercise participants felt that contact with USC prior to the exercise was minimal . . .

5. Research shows that when teams are able to examine information which shows problem areas and the consequences of their actions, they then can explore processing procedures and become aware of alternative ways of acting . . . Thus, I recommend that some procedure be formulated which will allow an analysis of the messages. The messages should be perhaps analyzed by the participants of the exercise with the assistance of a skilled outside agent . . . Analysis should be done both on an individual and team basis. As an individual begins to learn the consequences of his own actions, he becomes more aware of what he is doing and how it may help or hinder other team members . . .

6. The concept of "change" should be introduced into the EOST training process. Tennenbaum suggests that before change can take place organizations have to first realize the reasons for change. Second, the individuals should realize that change is going to be good for them. Third, they should realize that as a result of training and change, new behavior will be evoked from them if change is really going to take place. The participants obviously will have to develop new attitudes and perhaps change their entire frame of reference in order to cope with new concepts . . .

7. Observations have raised doubts about the ability of the city manager to lead a critique. The CDTP staff should evolve ways to effectively train the city manager to lead a good critique . . . Using the city manager for a critique would bring about better "esprit de corps," a true system or team effort . . .

8. It is well known to the reader of this report, that the after-action summary effort failed. It was not integrated effectively into the EOST process. The summary should have the verbal or written support of the city manager or one

of the top echelon personnel . . . Ninety days is too long a time period for completing the summary . . . Discussion is much more intense a week or two after the exercise, than it is three months after the exercise . . .

9. It seems that there should be some explanation or discussion of the military role. During many critiques, I have heard questions raised concerning the military role. A position could easily be formulated by a staff member through discussions with people such as Be McCulloch. The military role in the case of a disaster potentially could be quite significant, not as a "take-over" but as additional manpower and support . . .

10. Finally, there should be an attempt to improve the critiques. The city manager should perhaps focus the discussion during the latter part of the critique, especially after the second exercise. Further experimentation is needed.

OCD Evaluation of EOST Procedures

Background

The training office of OCD Plans and Operations has been monitoring the EOST program for several years. In the course of this, valuable evaluations have been made by the OCD training officer. These observations were reduced to draft form by Conrad Zimmerman of OCD and made available to the author. Following are selected quotations from that draft material.

Potential Objectives of EOST

1. Motivation.
2. Orientation (recognition of problems and associated responsibilities).
3. Concept realization (operational relationships and modus operandi).
4. System analysis (existing capabilities vs. mission requirements).
5. Plans development (to meet contingencies).

6. Determination of operational requirements (for emergencies): facilities, plans, equipment, personnel.
7. Determination of pre-emergency requirements (program development): organizational actions; legal (enabling legislation, mutual aid pacts); funding (program papers, budgeting); equipment procurement; staffing (assignments).
8. Determination of training requirements: (a) substantive and (b) quantitative.
9. Programming of training activities (in phase with anticipated progress on above actions).

Definitions

EOS I - A simplified simulation designed primarily for a small city or for any place with a relatively low degree of civil defense sophistication (low range of operational capability). The objectives tend to be limited to motivation and indoctrinational training.

EOS II - A sophisticated simulation wherein more complex problems are introduced. A broader range of objectives may be obtained by the injection of selected situations and/or by changing to basic method and procedures employed. Objectives may include operational analysis, system development, training, concept development, plans formulation or improvement, subsystems testing, program development, determination of requirements for budget, facilities, staffing, training, equipment, etc.

Clientele - The intended audience (persons to be trained) or "clients" of either type EOS is the same. This is the head of government, the civil defense director, the departmental heads of the operating agencies of government, the local military commander, executives of private corporations having public service responsibilities (utilities, construction industry, press, radio, TV, medical, etc.) and civic organizations with emergency responsibilities or capabilities (Red Cross, Radio Amateurs, etc.).

Some Simple Actions To Increase the Sophistication of an EOST

The CDUEP currently employs the EOS I type of simulation, with a certain amount of adaptation to local situations (the degree of CD sophistication and state of operational readiness).

Typically, the clientele are gathered in the "operations" room with various maps and other operational aids. Each section or "service" occupies a position marked "health," "police," etc. In an adjoining simulation room, personnel inject "police messages," fire messages,"

"health messages," into the play. This arrangement and methodology has apparent shortcomings:

1. Many of these problems are of a logistical or tactical nature such as are handled daily by the particular department. There is no new learning here, since the requirement for interservice or interdisciplinary coordination is lacking.
2. When coordination is required, it is often done on a bilateral basis, and the other departments may be unaware of the action except as it may be reflected on the status boards. (Hence the frequently heard complaint "I didn't know what was going on.")
3. In handling individual messages on minor matters, the department head is distracted from full attention and cognizance of overall, citywide conditions (hazards and/or operational actions of other departments) and higher level strategic or policy considerations which should be the prime concern of the command group.

Changes Recommended:

Two types of changes are proposed herein to improve EOS effectiveness:

1. Physical change - Although the procedural change and concept of operations is most important, a simple physical rearrangement of the working area will facilitate the change in concept. The physical change recommended is as follows: Place a large round table (or semi-circular or U-shaped arrangement of tables) in the center of the room with the chief executive at the head. Remove the service chiefs from their individual sections and seat them around this table. Allow the supporting staff to man the individual service sections. These sections can be satellited around the room or may be removed to smaller rooms adjoining the operations room.
2. Procedural changes - With the supporting service sections manned by deputies or other supporting staffs as appropriate, individual "service messages" will be routed only to the service section concerned. (The command group should not see individual messages.) Wherever possible tactical messages will be handled by that service or coordinated with other services without the necessity of referring the problem to the service chief for discussion at the round table. This frees the command group for consideration of broader issues of a policy nature.

Periodically, the flow of individual messages and other routine activities should be interrupted for a briefing to be presented to the mayor and the command group. This briefing should follow a general pattern beginning with the operations staff (RADEF, and damage assessment, civil defense director) followed by a situation summary by each service chief with respect to major problems and issues encountered by his service

which have an impact on other services. Following this, the command group should have a round table discussion of problems of general interest to all. At this point, the command group should:

(a) discuss alternative courses of action and expected effectiveness of results;

(b) analyze the logistical requirements and inter-disciplinary supporting actions required;

(c) arrive at a unified decision (ruled on by the Chief Executive if necessary) of policy, objectives, and general strategy to be followed by all concerned;

(d) following this, each service chief issues appropriate orders, through his own chain of command, to deploy the resources of his department in accordance with the overall command decision. This includes specific instructions for coordinated actions necessary in joint operations with other emergency services at subordinate command levels.

3. Advantage of these changes - stopping messages at the support staff level eliminates detailed message handling by the command group. Moving the "problem center" from the service desk to the mayor's round table:

(1) brings everyone into the information exchange/decision process;

(2) raises the level of problem-consideration/decision making from the "service" level to the command level;

(3) assures multi-disciplinary consideration of major problems which are of interest to all emergency services;

(4) assures that the decisions arrived at are unified decisions which are heard and understood by all;

(5) provides the best possible basis for coordinated instructions which subsequently flow down through the various chains of command;

(6) maximizes effectiveness in the deployment of resources and coordination and cooperation in joint operations involving field units of more than one service.

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<p>13. ABSTRACT This report presents evaluations of the OCD Emergency Operations Simulation Training (EOST) exercises conducted for local jurisdictions. The evaluations were based on observation and participation in five exercises as well as on analyses of the extensive experience of others. In addition, the research included estimates of current enemy attack capabilities, and studies of advanced civil defense conceptual developments.</p> <p>The EOST exercises are well received and beneficial to local jurisdictions. In many cases, the exercises are the primary exposure of local personnel to Emergency Operations Center and simulation techniques. The overall weakness of the exercises is that they attempt to accomplish too much in too little time. Specifically, it is concluded that there is need for (1) more definitive local emergency action plans, (2) inclusion of natural disasters to enhance interest and scope, (3) extension of policy and planning level training to cover the disaster recovery time period, (4) changes in exercise procedures and the roles of players, and (5) more stress on mutual aid problems, including areawide simulations.</p> <p>It is recommended that the EOSTs should be expanded in scope from single exercises to a training program. Following an introductory exercise, similar to the present practice, the expanded program should develop competence with the NEOP and NADOP documents. Resource allocation problems for the recovery phase from disaster should be presented at local planning and policy levels. Finally, the EOST program should be addressed to the extended area problems introducing the MACDO concepts.</p>		

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